ALL ABOUT HISTORY

NEW

"I thought the Japanese would take over the USA"
Eyewitness account of the Pearl Harbor attack

CAESAR
THE RISE TO POWER
How Julius Caesar transformed Rome from republic to empire

+
Taj Mahal
How to win a siege
Battle of Hastings
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21 discoveries that changed history

NAPOLEON VS WELLINGTON

Wellington won the war. Did Napoleon win history?



"Clay is a slave name"
Muhammad Ali and his battles in and out of the ring

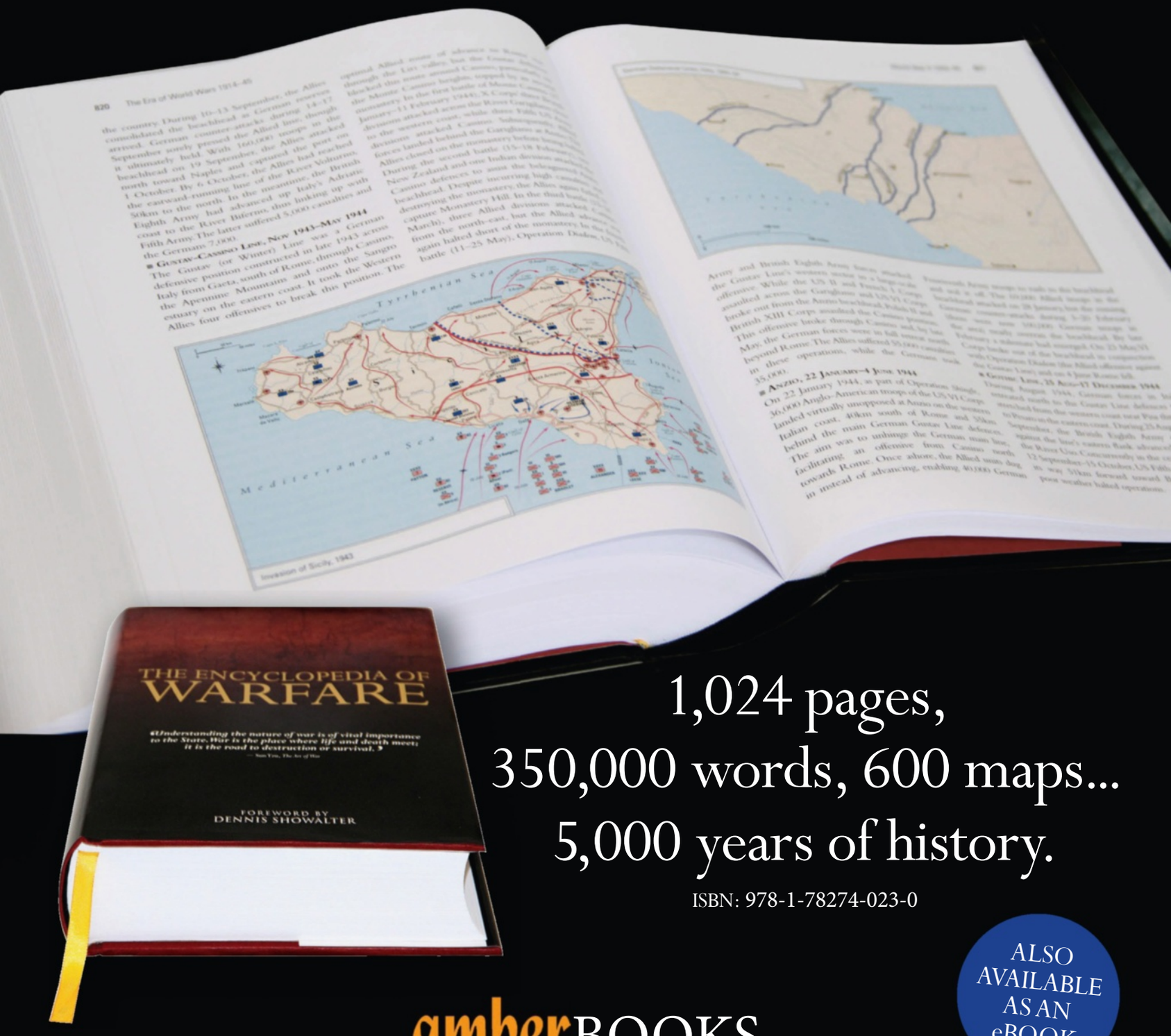
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ISSUE 004

10 infamous outlaws
A round-up of the all-time most wanted rogues



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Explosions rip through Pearl Harbor on 7 December 1941; read an eyewitness account of the Japanese attack on **page 34**

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How King William and his Norman invaders conquered Britain in 1066, laying the foundations for the British monarchy and empire.

68 **Caesar: The rise to power**
The ambition and wits of one man took Rome from republic to empire along a road paved with bloodshed, betrayal and bribery.

76 **How the world turned electric**
From Tesla and Edison to AC vs DC, we reveal the illuminating story of the minds which brought light and power to the world.

Welcome to issue four

"You must not fight too often with one enemy, or you will teach him all your art of war," is a quote attributed to Napoleon Bonaparte and one of two that have some resonance with the lead feature in this issue. Up until the Battle of Waterloo in June 1815, Napoleon had never faced his nemesis, Arthur Wellesley, First Duke of Wellington, directly on the battlefield, but although the Iron Duke had little chance to learn Napoleon's art of war first hand this didn't stop him winning a crushing victory that would end the ruler's reign. In this case then, the French emperor seemed to be wide of the mark.

In this feature we wanted to go beyond the bloody fields of Waterloo – to explore the character of these two great generals that still dominate European history. So just who was the greatest in terms of politics, leadership and the legacy they left behind?

From page 52 we reveal the stark differences but also the surprising similarities of two figures often viewed as polar opposites. Wellington, with his conservative opinions and reliance on discipline, may have won the war, but could it be Napoleon – with his ideals of liberty and revolution – who 'won history'?

"History is a set of lies agreed upon," is another line credited to Bonaparte, and with the many legacies attributed to him and his persona in modern times, I'd love to know if he'd still hold that opinion today...



Andrew Brown
Editor

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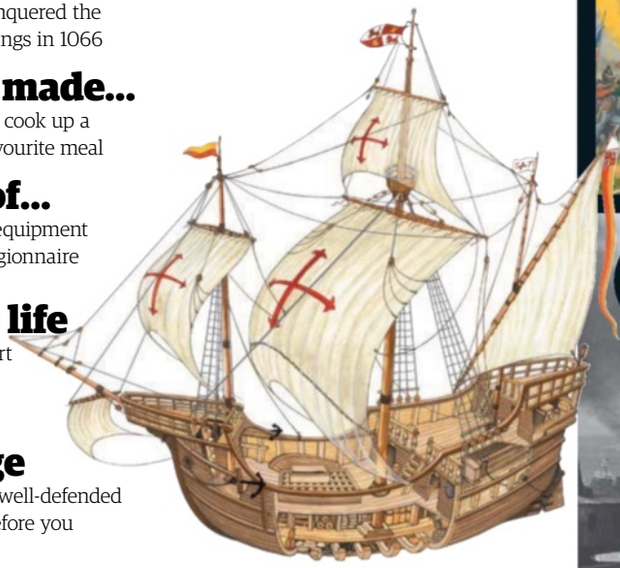
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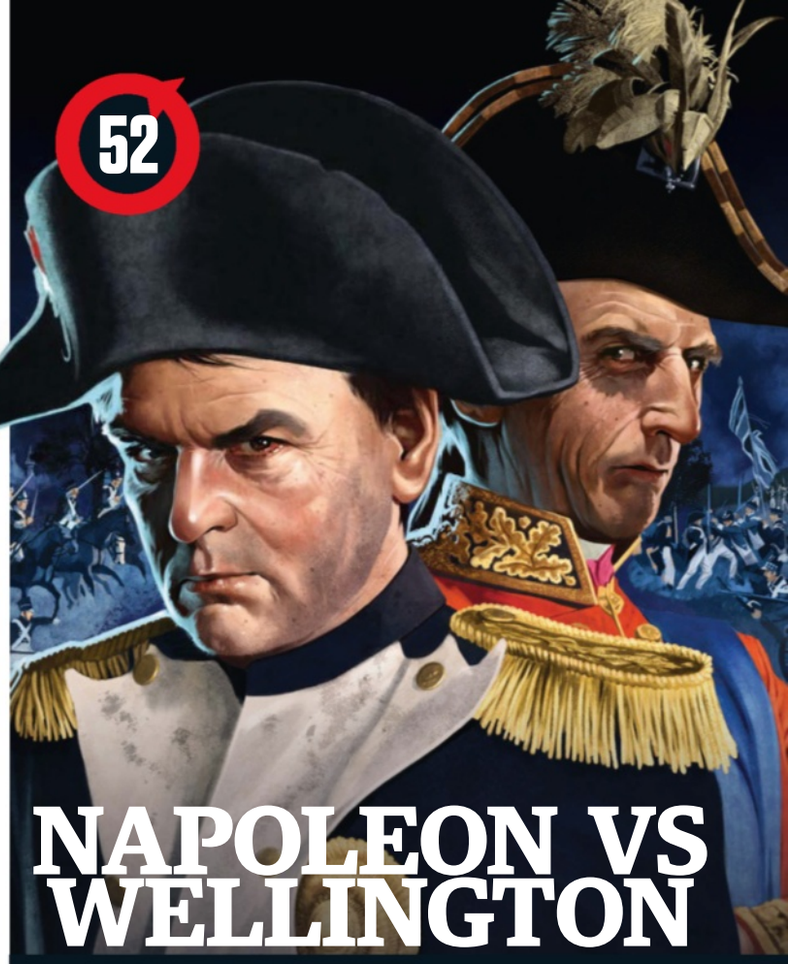
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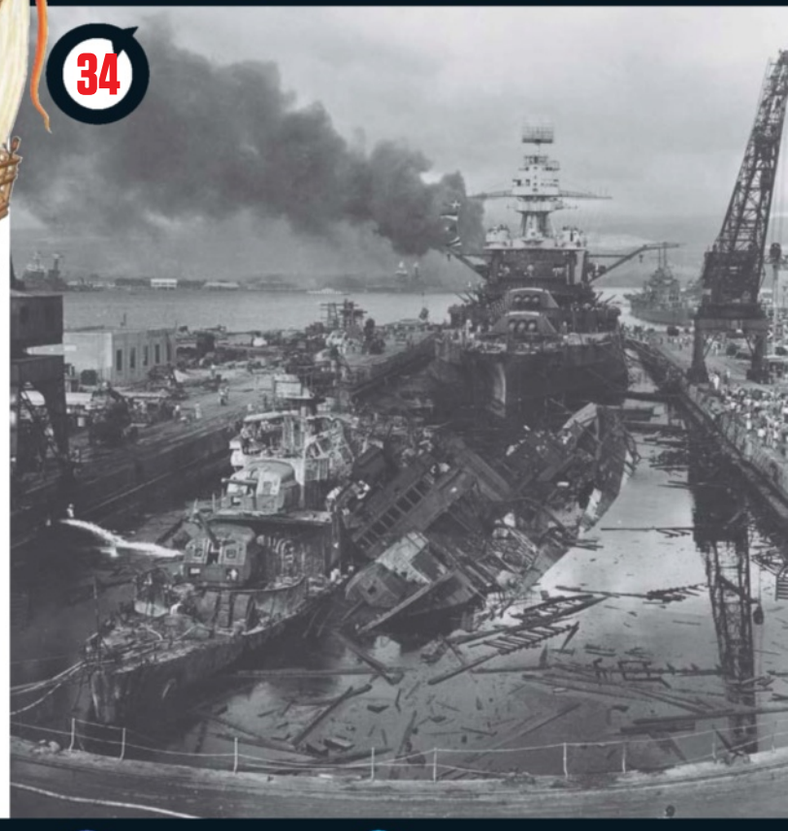
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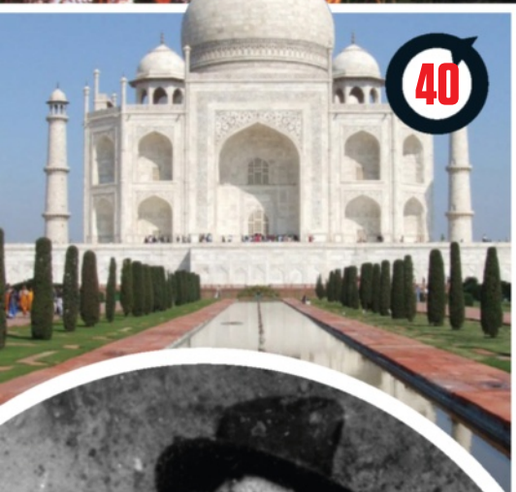
















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DEFINING MOMENT

RED FLAG OVER THE REICHSTAG

Two Russian soldiers raise the Hammer and Sickle over the Reichstag in an image that symbolises the fall of "The Fascist Beast" to the Soviet Union during the Battle of Berlin.The details surrounding the photo are the subject of some controversy and the identities of the soldiers are often contested.

30 April 1945





© Getty



DEFINING MOMENT

IRANIAN WOMEN ON THE MARCH

Iranian women march through the streets of Tehran armed with AK-47 machine guns in a display of military muscle to commemorate the 19th anniversary of Iran's eight-year war with Iraq. Other hardware on display at the military parade included two homemade surface-to-surface missiles.

22 September 1999



© Getty



DEFINING MOMENT

A CROSS TO BEAR

Martin Luther King Jr pulls up a burnt cross from his front lawn while his two-year-old son looks on. A calling card of the Ku Klux Klan, it was one of many left at African-American homes.

27 April 1960

©Corbis



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The Roman legion conquered far and wide until their empire included most of the known world

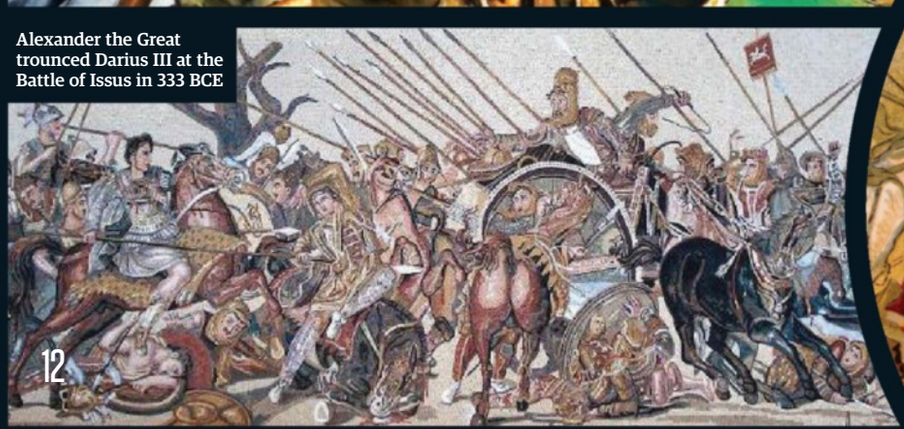
Conquest

EMPIRES GAINED BY THE SWORD

Subjugation and acquisition by force have been common since tribal times. We present a guide to conquests both ancient and modern



Alexander the Great trounced Darius III at the Battle of Issus in 333 BCE





Spanish conquistador Hernán Cortés fighting for Tlaxcalan territory in Mexico during 1519



The Sun never set on the British Empire (red) in 1897



Italian general Emilio de Bono prepares his troops to attack Ethiopia, 1935

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Meet the soldiers who conquered most of the known world

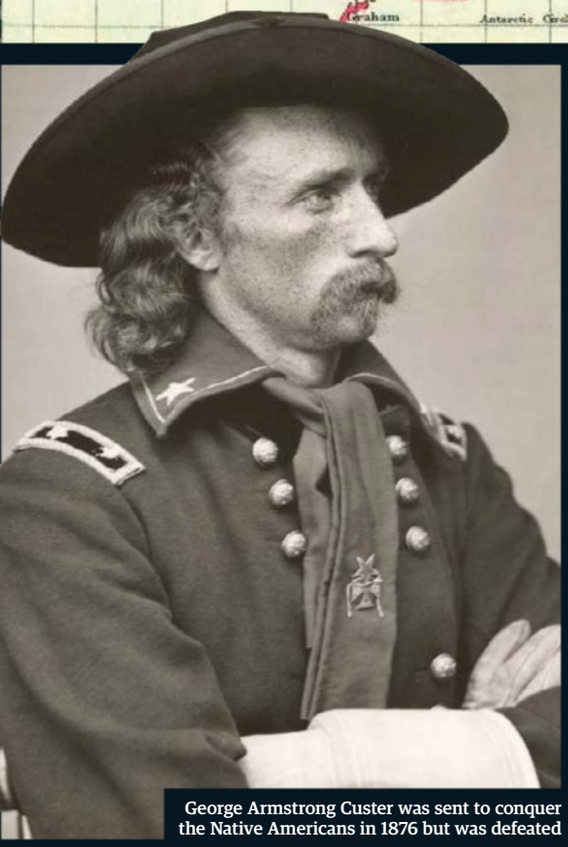
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Fascinating insights into perhaps the greatest conqueror of all time

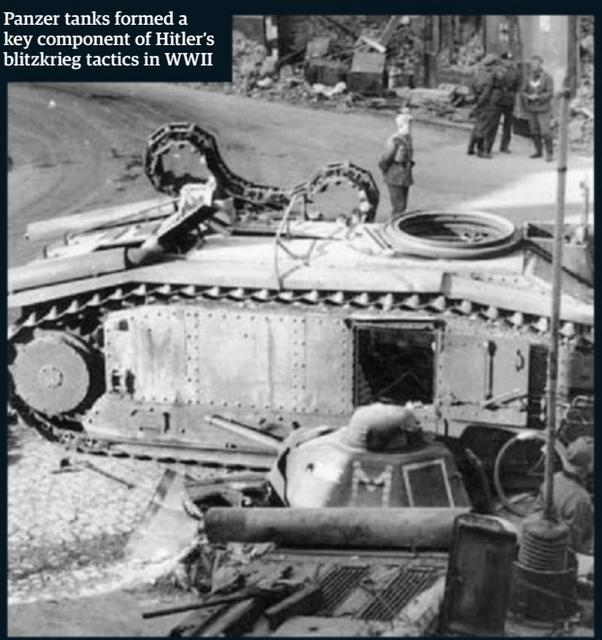


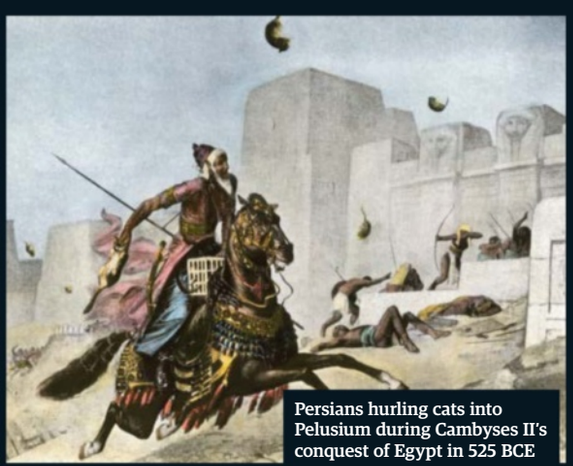
George Armstrong Custer was sent to conquer the Native Americans in 1876 but was defeated

Alexander the Great founding the city of Alexandria, Egypt



Panzer tanks formed a key component of Hitler's blitzkrieg tactics in WWII





Persians hurling cats into Pelusium during Cambyses II's conquest of Egypt in 525 BCE

© Alamy; Getty; Look and Learn

Conquest across history



Attila the Hun
HUNGARY 434-453

Inheriting the throne of modern-day Hungary, Attila the Hun soon began a campaign of slaughter and conquest. From the brutal savaging of the Goth tribes of central Europe through to the dying remains of the Roman Empire, Attila won territories that stretched from Germany to the Caspian Sea. His actions earned him the name 'Scourge of God'.

Persian Empire
PERSIA CIRCA 550 BCE



Cyrus the Great allowing the Hebrews to return to the Holy Land

Long before Darius III and the Persian Empire's defeat to Alexander the Great, Cyrus the Great was establishing the empire through a life-long pursuit of conquest. From his uniting of the tribal Medes and Persians, through to his total subjugation of Asia Minor and North Africa, Cyrus was an unstoppable force that forged an empire that stretched from Greece to India. The conquests of Cyrus are detailed by Herodotus in his *Histories* - one of the most renowned being his victory over Lydian king Croesus around 547 BCE.

King of the Franks
EUROPE CIRCA 747-CIRCA 814

Charlemagne, aka King of the Franks, left a legacy of conquest that would resonate down the ages. So much so, in fact, that aristocratic families across all of Europe would flaunt any remote relationship to the conqueror, because he was considered the ideal Western ruler. Charlemagne spent his entire life undertaking 53 military campaigns, extending Christian Europe's influence over many foreign lands.



Charlemagne was the first Holy Roman Emperor

Conquest timeline

Napoleon of Egypt
Thutmose III is recorded to have conquered over 350 cities and large areas of the Near East during his 54-year rule of Egypt in the 15th century BCE.
1479-1425 BCE



Thutmose III (right) presents an offering to deity Horus

Darius I conquers Egypt
Controlling the mighty Persian Empire at its height, as soon as Darius I came to power he defeated Egyptian pharaoh Cambyses II and took the country for his own.
522 BCE



A relief of Darius I from Persia

Ashoka the Great
An Indian emperor of the Mauryan Dynasty, Ashoka conquered almost all of the Indian subcontinent in the third century BCE.
269 BCE

Qin Shi Huang
The first emperor of China, Huang conquered many of the warring Chinese states and unified them in 221 BCE, ushering in almost two millennia of imperial rule.
221 BCE



Huang is famed for his Terracotta Army

Rome takes Gaul
Julius Caesar's thirst for conquest was no more sated than in his eight-year campaign against the Gauls.
58-50 BCE



Hannibal's famous crossing of the Alps

Hannibal's rampage
From 218 BCE when he left New Carthage through to the Battle of Zama in 202 BCE, Carthaginian general Hannibal conquered lands from Spain to Sicily.
218 BCE

Victorious Viking
Rurik, a Varangian (Viking) chieftain, spent much of his life conquering large swathes of Russia, and formed the Rurik Dynasty.
Circa 864-879



The Rurik Dynasty was in power until the 17th century

Mahmud of Ghazni
From Ghazni's ascension as Sultan of Ghazna circa 998, he conquered much of Mesopotamia and the Indian subcontinent in the name of Islam.
1002

Gaius Octavius
The first emperor of the Roman Empire, Octavian expanded Rome's influence through Hungary, Croatia and Egypt with a series of military campaigns.
27 BCE

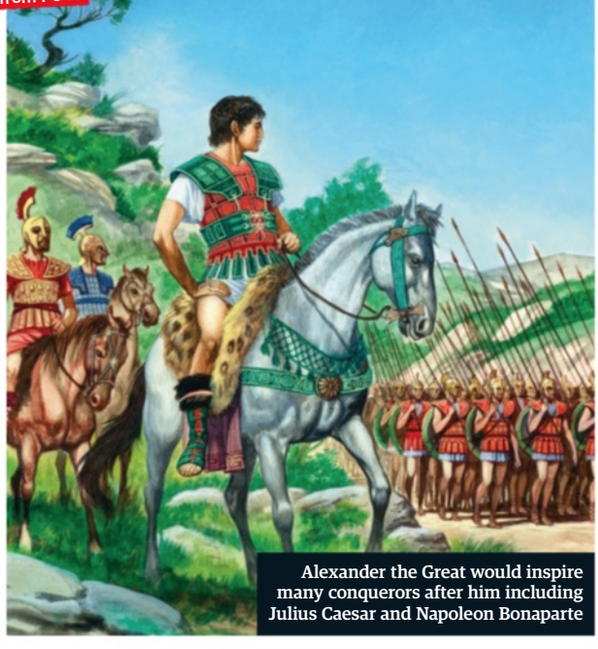


Gaius Octavius, better known as Augustus

Cyprus and the Lionheart
En route to the Crusades, Richard the Lionheart conquered the island of Cyprus, wresting it from the despot ruler Isaac Komnenos.
1191

The Crusades
For over 300 years in the High and Late Middle Ages, Catholic Europe waged a series of Crusades to take eastern lands under Muslim control.
11th-13th centuries

1600 BCE | 1400 BCE | 1200 BCE | 1000 BCE | 800 BCE | 600 BCE | 400 BCE | 200 BCE | 0 | 200 CE | 400 CE | 600 CE | 800 CE | 1000 | 1050 | 1100 | 1150 | 1200 | 1250



Alexander the Great would inspire many conquerors after him including Julius Caesar and Napoleon Bonaparte

ALEXANDER THE GREAT'S PATH TO GLORY
GREECE/EGYPT/ASIA/PERSIA/INDIA 356-323 BCE

One of the most famous conquerors of all time Alexander the Great cut his way through Greece, Asia Minor, Asia and even reached India in his quest to expand his territory. Indeed, by the age of 30 he had conquered and united every Greek state, destroyed the mighty Persian armies of Darius III, taken Egypt, wrestled one of the largest cities in the world - Babylon - from its incumbent ruler and forged a colossal empire by the blade that would go down in history as one of the biggest. It is testament to Alexander's legacy of conquest that after his death - he caught a mortal fever at 33 years old - Julius Caesar, Augustus and Caligula all travelled to his resting place in Alexandria, Egypt (named after him), to pay their respects. Unfortunately, following his death, the vast empire collapsed due to Alexander's generals in-fighting.

Battle of Hastings
ENGLAND 1066



The Normans at Hastings were greater in number and also better rested

Recorded in the famous Bayeux Tapestry, Duke William of Normandy's invasion and subsequent conquering of England in 1066 had a marked and lasting legacy. It impacted everything, from the written and spoken language through to the economy and new forms of architecture. However, as conquerors go, William was arguably tame compared to some of his historical forebears, with most of his reign spent struggling to keep control of his own lands. Invading forces from Scandinavia and rebellious groups in England prevented him from any further expansion after his decisive victory over the Anglo-Saxons at Hastings.



MONGOL EMPIRE IN THE MAKING

ASIA 1162-1227

If Alexander the Great conquered foreign lands that stretched thousands of miles, then Mongolian leader Genghis Khan brutally claimed four times that area, making enemies from Afghanistan to northern China. Indeed, as a conquering force Khan was arguably the most terrifying of all time, gaining a reputation as unbeatable in the field. He became notorious for creating a huge mountain of the skulls of his slain enemies in China. Later, his grandson Kublai Khan would become emperor of China and the founder of the Yuan Dynasty.

Invasion of Poland

POLAND 1939

One of the more recent examples of military conquest can be seen in Nazi Germany's territorial expansion during World War II. In a few short years Hitler and his generals steamrollered Poland, France, Luxembourg, the Netherlands and Belgium, while they extended their reach into Italy, Spain and even North Africa (the latter in which they had much success initially under the command of Rommel). In fact, it was this greed for territory that arguably eventually lost Hitler the war, with his invasion of Russia in June 1941 backfiring and effectively losing him the Eastern Front.



German soldiers enter Poland in 1939



After Wales, Edward I would attack Scotland

Wales under attack
English king Edward I began his six-year conquest of Wales.
1277



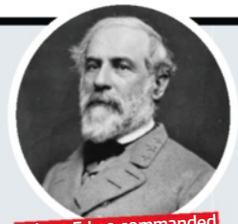
At first the Aztecs saw Cortés as a god

Cortés takes Mexico
Hernán Cortés led a massive invasion of mainland Mexico on behalf of the Spanish crown in 1519, which would eventually lead to the fall of the Aztec Empire.
1519



Frederick II was even crowned king of Jerusalem after the Sixth Crusade

Prussian expansion
During Frederick II's reign as king of Prussia he vastly expanded his father's kingdom, conquering Silesia and many other parts of eastern Europe and beyond.
1740-1786



Robert E Lee commanded the Confederate troops with much success

Confederate posterboy
When Robert E Lee went on the offensive with the Confederate Army during the American Civil War, he claimed a lot of land before defeat at the Battle of Gettysburg.
1861

1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900



Timur feasting near Samarkand, Uzbekistan

Timur Lang
The last great Mongol leader, Timur Lang – which means Timur the Lame – conquered much of Asia in the 14th century.
1370

Guatemala invasion
Spanish conquistador Captain Pedro de Alvarado started his brutal conquest of Guatemala in South America.
1523

Fall of the Incas
In launching his third invasion of Peru in 1530, Spanish conquistador Francisco Pizarro managed to conquer the Incan Empire and later execute its leader Atahuallpa.
1530



Like Cortés before him, Pizarro destroyed the Incas

Nelson rules the seas
From the day of receiving his own command in 1779 right through to his death in 1805, Admiral Nelson controlled the seas of Europe for the British crown.
1779-1805



Nelson died at Trafalgar in 1805

First French empire
After Napoleon Bonaparte became emperor of the French on 18 May 1804, he proceeded to conquer much of central Europe and establish the first French empire.
1804



Napoleon at the Battle of Friedland in June 1807



Native Americans attack the village of St Louis, MO

COLONISATION OF AMERICA

AMERICA 17TH-19TH CENTURIES

Following the West's 'discovery' of America and subsequently setting up the first colonies, a series of military campaigns resulted in the conquest of virtually all the Native American tribes. Led at first by the English and later by Americans, the acquisition of Native American territory - driven primarily by a lust for land and valuable resources like gold - would lead to the surviving Native American tribes being displaced onto reservations, often far from their original lands, and typically being financially disadvantaged.

Rise of the Incan Empire

SOUTH AMERICA 1438

Pachacuti Inca Yupanqui was one of the most unhinged and bloodthirsty conquerors of all time. From the defeat of the warmongering Chanka group of Peru, through to the brutal slaying of all rival ethnic groups throughout western South America, Pachacuti was a fearless warrior - one that history records had no qualms about drinking from the skulls of his slain enemies! Regardless of his blood lust though, the conquests throughout his lifetime left him and the Incan Empire as the foremost power in the continent.



Pachacuti Inca Yupanqui

© Look and Learn/Illustrated London News Mustafin

STRONG CAVALRY

Unlike the Anglo-Saxons, the Normans were horse masters who brought numerous cavalry units into battle. Noble knights were trained from an early age in horsemanship and use of the lance, a spear-like weapon that could be used both in hand-to-hand and ranged combat. These cavalry units were therefore well trained and well equipped and, at the Battle of Hastings, proved pivotal to victory.

STRONG INFANTRY

The Anglo-Saxon force led by King Harold consisted of a large body of infantry and archers, with very few cavalry units. This was partially due to Harold's depleted force after the Battle of Stamford Bridge, but also because this is how Harold's army was set up to fight, with ranks of infantry relying on fierce melee combat rather than complex manoeuvring tactics to win.

KING HAROLD

King Harold had been ruler of England since 6 January 1066, taking the crown after the death of Edward the Confessor. Prior to the Battle of Hastings Harold had already had to defend his crown by repelling a large invading force led by Harald Hardrada of Norway, defeating them at Stamford Bridge. Directly after Harold marched his army all the way to Hastings – a decision that would cost him not just his crown but also his life.



RAIN OF DEATH

The one thing the Anglo-Saxons did bring to the battle was their elite longbowmen. These archers, who were considered the best in the world for centuries, bombarded any advance made by the Norman-French cavalry and infantry, bringing down a rain of arrows from a relatively safe, elevated position behind the Anglo-Saxon shield wall.

GREATEST BATTLES

BATTLE OF HASTINGS

HASTINGS, ENGLAND 14 OCTOBER 1066

One of the most influential conflicts in British history, the Battle of Hastings was a cataclysmic culmination of a war of succession, with three potential heirs to the English throne duking it out for control of the island nation. At the start of the war there were three competing for the throne, which Edward the Confessor had held till his death. These were Edward's cousin, Duke William of Normandy; Harold Godwinson, the most powerful man in England; and the Norwegian Harald Hardrada, who was king of Norway and distantly related. These three rivals were soon reduced to two however, with Harold Godwinson defeating Harald Hardrada at the Battle of Stamford Bridge in Yorkshire, England, on 25 September 1066.

This defeat left just Duke William of Normandy and Harold Godwinson to battle it out for the title of king; in fact, Godwinson took the title prematurely after Stamford Bridge, believing that Edward had promised him the throne before his death, despite his closer familial relation to William. This angered the French duke immensely and, after gaining support from the Vatican, he assembled a vast army consisting of men from Normandy, Flanders, Brittany and France (ie Paris).

Just days after the Battle of Stamford Bridge, William set sail for England and, landing on the south coast, began moving towards London. Harold soon got wind of the invasion and, reassembling his remaining army, marched south at great speed to intercept William. The two armies met on Senlac Hill about ten kilometres (six miles) north-west of the town of Hastings in Sussex.

Harold approached the battle three weeks after the Battle of Stamford Bridge with a depleted and tired force (they had marched all the way back from Yorkshire), while in contrast the Norman-French forces were fresh and greater in number. As can be seen in the detailed battlemap and run-through of the key events overleaf, it was an incredibly bloody affair and one in which we all know William came out on top, subsequently taking the English throne.

Many reasons have been put forward by military historians for Harold's defeat, but most agree on three pivotal points. Firstly, he was too keen to engage the threat of William, marching an exhausted army all the way from northern England at great speed to fight. Secondly, despite stopping by in London en route to face William, he failed to appreciate the city's defensive capabilities and didn't hole up there – a move that would have swung the odds much more in his favour. And finally, after taking up an advantageous position on the battlefield (atop Senlac Hill) he failed to maintain discipline within his troops, which meant the lines were broken easily by a little deception.

Unlike the results of many other succession wars, this outcome radically altered the way England developed. Once William had succeeded Harold, the Norman Conquest of the country began proper – a process that would see the vast majority of the ruling classes displaced as well as a complete overhaul of the country's administrative structure – the *Domesday Book* is great evidence of this.

The Anglo-Saxon language was also phased out in favour of French, trading and diplomatic ties with mainland Europe strengthened, new stone castles, cathedrals and civic buildings were built all over the country and England became a new financial powerhouse in Europe. Indeed, modern England – and Britain in general – was hugely shaped by the Norman takeover.

Anglo-Saxon

TROOPS 7,000
CAVALRY UNKNOWN
CANNONS 0



KING HAROLD II
LEADER

Prior to becoming king of England, Harold was a powerful nobleman and earl of several counties including East Anglia and Wessex. He accrued power through a number of successful military campaigns.
Strengths A battle-hardened warrior-king with a strong army and plenty of combat experience
Weaknesses Overly confident after Stamford Bridge; few tactics



LONGBOWMEN
IMPORTANT UNIT

Excellent shots and fast on their feet, longbowmen specialised in bombarding enemies with arrows.
Strengths The most well-trained and accurate archers in the world
Weakness Like all archers, they are fairly vulnerable up close in hand-to-hand fighting



LONGBOW
KEY WEAPON

A fearsome weapon that took out many Norman soldiers early on. It was the sniper rifle of its day.
Strengths Amazing range and stopping power compared to standard bows
Weaknesses Required great upper body strength and lots of practice

01 Senlac Hill

The battle commenced with King Harold arranging his army on Senlac Hill, an elevated position close to Hastings. A mix of infantry and archers was laid out with the foot soldiers forming a vast, defensive shield wall from which Harold intended to repel any Norman-French advance.

02 OPENING BARRAGE

William laid out his forces a little way from the hill and ordered his archers to fire. His lower elevation and the size of the Anglo-Saxon shield wall meant little damage was caused.

03 The wall holds

After witnessing the ineffectiveness of his archers, William ordered his archers to rejoin his infantry units and charge the enemy as one force. As the Norman infantry approached the hill, English archers unleashed many volleys to great effect. When they reached the shield wall, fierce hand-to-hand combat ensued.

04 William not dead

With the Norman-French infantry now engaged with the Anglo-Saxons, William ordered some of his cavalry units to bolster them from the rear, but after over an hour of fighting the shield wall remained intact. Disastrously for William, the left flank of his forces was broken by the Anglo-Saxons. At the same time, a rumour spread that William had been killed. To quash this the Duke removed his helmet and raced across the battlefield to intercept the Anglo-Saxons.

05 CUT OFF

Believing to have critically broken the Norman-French line, the group of Anglo-Saxon infantry that broke the Norman-French left flank pursued the retreating men down the hill. While they killed more men, they left themselves exposed and cut off – a fatal mistake.

06 Feigned flight

Around 1pm, the Anglo-Saxon shield wall still held. William ordered his forces to retreat and regroup. After a brief hiatus William decided to switch tactics, employing his cavalry to initiate a series of feigned flight assaults.

10 ANGLO-SAXONS FLEE

The news quickly travels that Harold has been killed and the Anglo-Saxon army began to disintegrate. William's forces pursued them, while William was named victor.



09 King Harold killed

William's play was a success and in the early evening the Anglo-Saxon shield wall finally broke. A period of intense, desperate fighting began on the hill, with many troops falling on both sides. There was little to no positional discipline now. Around 6pm Harold's personal standard was attacked and the English king, who had already been injured, was killed.



07 Shield wall breaks

The tactic worked, drawing Anglo-Saxons out of the shield wall and down the hill. This forced the wall to contract, reducing its width and finally exposed Harold and his few elite cavalry units. The portion of the Anglo-Saxon shield wall that had pursued the Norman-French cavalry was surrounded and killed.

08 HAROLD'S INFANTRY OUTFLANKED

The contracting shield wall made outflanking Harold easier. William instructed his remaining cavalry to attack the wall on both sides.

Norman-French

TROOPS 10,000
CAVALRY UNKNOWN
CANNONS 0



DUKE WILLIAM II

LEADER

A physically strong leader who was well known for his excellent riding skills, Duke William was a solid all-round leader. His ability to alter his tactics on the fly and improvise when things were not going his way was crucial to this huge victory.
Strengths A physically impressive leader with excellent horsemanship
Weakness Relatively inexperienced when it came to battle



CAVALRY

IMPORTANT UNIT

Fast, agile and – in the Normans' case – incredibly well trained, the cavalry arguably won this battle.
Strengths A unit with excellent manoeuvrability and speed
Weakness Vulnerable to spear/pike-wielding infantry as well as flanking archer fire

LONGSPEAR

KEY WEAPON

An ancient weapon that was great for melee combat as well as short-ranged potential via throwing.
Strengths A versatile weapon that can be used in both hand-to-hand combat or as a missile
Weakness Required years of training to use effectively

© Look and Learn. Sayo Studio

How to make...
MONGOLIAN PANCAKES

ASIA, 13TH CENTURY



Ingredients
- 2 carrots
- 1 stick of celery
- 2 spring onions
- 200g (7oz) of bean sprouts
- 1 tbsp butter
- 2 cups of heavy cream
- Vegetable stock
- 1 pinch of saffron
- 2 eggs
- 1 cup of water
- 1 cup of flour

The medieval Mongolian diet was traditionally based around large quantities of meat, often fried in warriors' upturned shields. However, Kublai Khan – the fifth great leader of the Mongol Empire and grandson of Genghis – had a penchant for Chinese culture; along with his study of Buddhism, he also had a fondness for vegetable pancakes in saffron sauce.

METHOD

We don't know the exact details of Kublai's meat-free snacking, but he supposedly filled his pancakes with finely chopped vegetables and smothered them in a creamy saffron sauce. While it's possible he also ate these vegetables raw, we are, of course, free to diverge from and improvise around this most unconventional of Mongolian dishes.

01 Prepare your carrots and celery by first washing them and then using a sharp knife to slice them into very thin, short strips (ie julienne). You can now either place them to one side ready for frying later, or follow Kublai's example and leave them to be eaten raw. At this stage you can also finely chop your spring onions in preparation for the saffron sauce. The bean sprouts, meanwhile, don't require any special preparation.

02 To make the sauce, start by melting a knob of butter with a splash of oil in a medium-sized saucepan. Add in the chopped spring onions now and leave to soften for two minutes.

03 Add the heavy cream, vegetable stock and saffron, then bring it just to the boil. You can now leave this to simmer on a low heat for around 12 minutes, seasoning to taste.

04 Once the sauce has reduced enough, finely sieve it into a saucepan and leave on a low heat until you're ready for it to be added to the pancakes. Alternatively you can sieve it into a container for putting in the fridge to use later.

05 To make the pancakes, first whisk together the eggs, water and flour, leaving no lumps. Prepare a medium-sized frying pan with a generous amount of cooking spray, or vegetable oil, and set to a medium heat.

06 Pour in a small amount of the batter into the pan, tilting it to form a thin circular disc. When one side is cooked, carefully turn the pancake and cook until ready. Repeat this step until you have used up all the batter.

07 Next heat a frying pan, or ideally a wok, until it's very hot. Add a tablespoon of vegetable oil, while being careful of spitting, and add in some bean sprouts and a portion of your vegetables (not the entire batch). Stir the vegetables constantly, turning them over the hottest part of the pan until they're cooked through.

08 Finally fold up your fried vegetables in your prepared pancakes, serve with a generous lashing of the saffron sauce and, there you have it – a medieval Mongolian delicacy, fit for a khan, ready to serve up to your banqueting table.

THE Anatomy of

A ROMAN LEGIONNAIRE

SOLDIER IN THE ROMAN ARMY, ANCIENT ROME, CIRCA 750 BCE – 476 CE



CASSIS

A HELMET AS MUCH FOR SHOW AS IT IS PROTECTION

The Roman legionnaire's helmet was made from bronze and provided protection for the whole head. The plumes on the top were usually made from horsehair or feathers, though may have only been worn for ceremonial duties.

PILUM

TAKING OUT ENEMIES FROM AFAR

Metal-tipped and with a weighted end, the legionnaire's javelin was between 1.8 and 2.1 metres (six and seven feet) long. It could be hurled to devastating effect and was accurate up to around 30 paces in some hands.

GLADIUS

THE PRIMARY WEAPON USED DURING CLOSE COMBAT

Adopted during the Punic Wars, this short sword was the legionnaire's main offensive weapon of choice. It was primarily a thrusting and slashing sword, ideal for close combat, and became part of the legionnaire's signature parry-and-stab move.

TUNIC

A LAYER OF PADDING BELOW THE LORICA SEGMENTATA

Worn underneath the armour coming down roughly to the middle of the thigh, the tunic was made out of rough wool, and was most often red or left undyed (white). The only colours not used were black (because it symbolised death) and pink, yellow and green, as they were considered feminine.

CALIGAE

THE LIGHTWEIGHT FOOTWEAR THAT WAS BUILT FOR LONG MARCHES

Despite superficially resembling sandals, these were in reality marching boots, made of leather with heavy soles. They were designed to allow air to circulate around the feet and reduce the risk of blisters during marching, although in colder locations (like Britain) woollen socks were often worn with them.

LORICA SEGMENTATA

A COAT OF METAL TO DEFLECT ATTACKS

Once only used by the highest-ranking soldiers, this form of armour eventually became standard after the Romans perfected the ability to mass-produce metal goods. Consisting of strips of iron or steel that had been heated by coal and quenched in oil or water, it was perfect for deflecting swords and arrows.

SCUTUM

A SHIELD USED FOR BOTH DEFENCE AND OFFENCE

Constructed from plywood and covered in leather, the oval-shaped shield called a scutum was over a metre (3.3 feet) in length, and proved a valuable defence against ranged weapons. Up close, it could also be used as a weapon.

© Ian Jackson/The Art Agency

Day in the life

A PANZER CREWMAN

WORKING WITH A PANZER TANK ON AND OFF THE BATTLEFIELD

EUROPE, WWII (1939-1945)

The Panzer tank was a symbol of the military might of the German army during World War II, demonstrating the potency of their armoured forces to deadly effect. Being part of the crew of a Panzer tank may have put you in the possession of an extremely powerful weapon, however at the same time it painted a massive target on you. Conditions inside the vehicle itself were cramped, hot, noisy and uncomfortable, with the operators never getting a moment's peace. Moreover, the mortality rate was high – one direct hit was usually enough to critically damage a Panzer, with its passengers rarely surviving such an assault.

"Conditions inside the vehicle itself were cramped, hot, noisy and uncomfortable"

1 WAKE UP

A typical day of a Panzer crew member involved getting up around 6am, followed by a morning roll call an hour later. This was usually followed by between one and two hours of drills conducted by the senior NCO (non-commisioned officer) or another figure of similar rank.

2 WASHING

Even while on duty, the crew of a Panzer were expected to find the time to take care of their personal hygiene and make sure that their uniform was kept presentable. Any damaged items of clothing and footwear were taken to the supply sergeant for either exchange or repair. The crew would either do their own laundry, or tasked someone local to do it for them – usually in exchange for rations.



Like all soldiers, Panzer troops were expected to keep their uniform spic-and-span

3 TRAINING

There were training platoons for each of the different functions within the Panzer crew – most notably for the gunners, drivers and radio operators whose roles called for the most practice. Training would often start the day and took place in platoons, with troops playing the roles of individual tanks. There were also live firing, weapons theory and maintenance lessons, such as how to change track links and road wheels.



Soldiers of the Third SS Division Totenkopf break for a meal beside the wreck of a Soviet T-34



Though Panzer tanks were tough, they were far from invincible

MAINTENANCE

Technical maintenance was an ongoing task, and was expected to take place at regular intervals. These inspections targeted moving parts like the running gear, making sure mountings and racks were secured and that equipment was correctly stowed away as per the manual. These were intended as preventative measures to avoid the tank breaking down during operations.

BATTLE



Later Panzers are claimed to have hit tanks 4km (2.5mi) away!

In the event of battle, the five crew members (that is, commander, driver, gunner, radio operator and loader) worked as a unit. There was a high mortality rate among crew members of a Panzer tank, as although they were relatively well shielded in comparison to other infantry types, one direct hit would usually incapacitate a tank, with little chance of escape.

REPAIRS

With combat and the daily grind constantly taking their toll on the vehicles, making sure a regular programme of repairs was adhered to was vital. All repairs and checks were recorded in a logbook, and were done on an ongoing basis. The entire crew was expected to remain with the tank while maintenance was taking place.

RECREATION

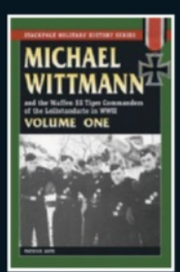
If time and circumstances permitted, the Panzer crew could enjoy some much-needed downtime. Many would have participated in physical activities like sport, while others wrote letters home, played music or bartered with locals for rations.

SLEEP

War was never fought to a timetable and combat hours often meant that the crew went days without sleep, so the chance to sleep was grabbed whenever it was readily available. The tank itself wasn't designed with slumber in mind; it was cramped and uncomfortable, so sleeping atop or underneath the tank wasn't uncommon.

How do we know this?

Michael Wittmann And The Waffen SS Tiger Commanders Of The Leibstandarte In WWII: Volume One by Patrick Agte, which focuses on the life and career of the German tank commander, provided an invaluable insight into the day-to-day life of Panzer crews. Similarly, *Panzer Tactics: German Small-Unit Armor Tactics In World War II* by Wolfgang Schneider was also useful, describing in detail the measures implemented by the German forces in order to ensure that regular maintenance schedules were adhered to, as well as looking at some of the more mundane aspects of army life, such as personal hygiene. There is also other anecdotal evidence provided by surviving Panzer crew members.



© Getty, Bundesarchiv

How to WIN A SIEGE

5 FAMOUS SIEGES

TROY, ANATOLIA
CIRCA 12TH CENTURY BCE

Perhaps the most famous siege of them all, the Greeks allegedly entered the city using the Trojan Horse filled with soldiers.



JERUSALEM, JUDAH
701 BCE

The defending Judaeans blocked springs outside Jerusalem and, having cut off safe water, the Assyrian army was hit by disease.

TYRE, OFF LEBANON
332 BCE

On an island, surrounded by walls and seemingly unreachable, Alexander the Great built a 0.8km (0.5mi)-long causeway and used siege works to gain access.

ALESIA, GAUL
52 BCE

Led by Julius Caesar, the Romans built two huge walls around the city to keep the Gallic army in and supplies out, eventually leading to the Alesians' surrender.

YORKTOWN, VA, USA
1781

The decisive battle of the American Revolutionary War, American and French forces surrounded and bombarded the British, forcing their surrender.

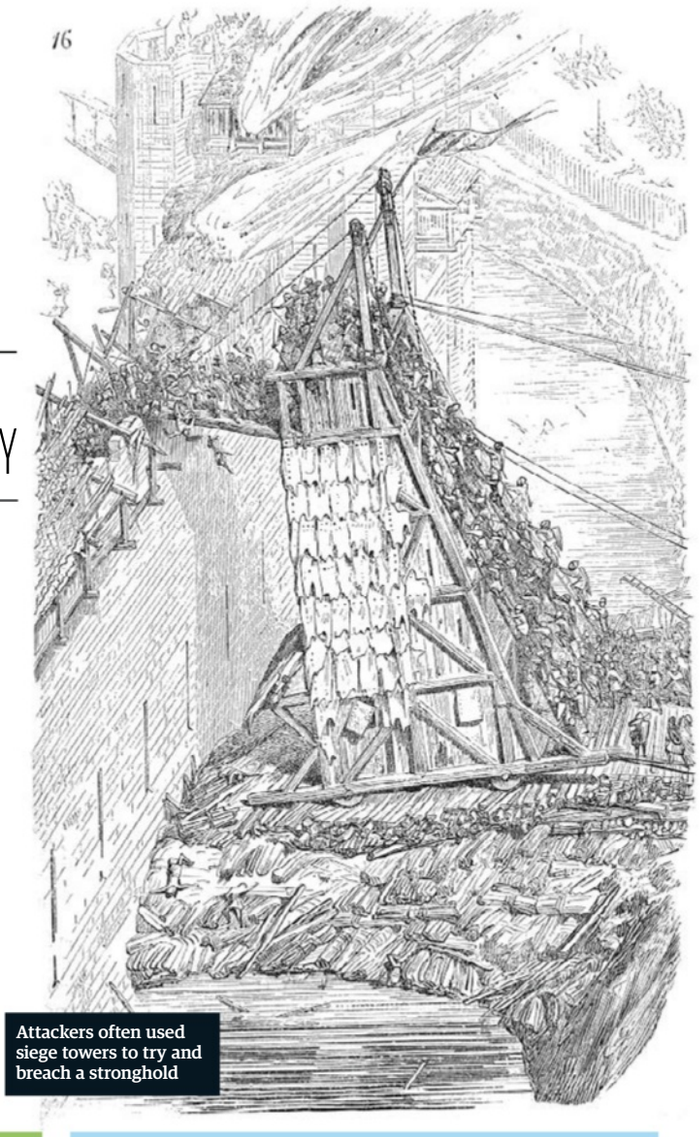


GAIN CONTROL OF AN ENEMY STRONGHOLD, PRE-19TH CENTURY

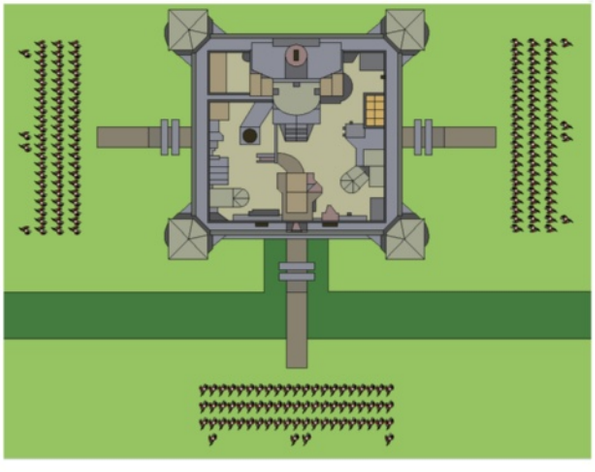
Deriving from the Latin 'to sit', taking a city or fort by siege was a unique style of warfare used right up to the Napoleonic era, when higher-powered cannons made short work of fortifications.

However, before this occurred siege warfare played a key role in many battles for centuries, with both the attacking and defending sides striving to come up with new innovations that would tip the balance of power decisively one way or the other. Battering rams, trebuchets and siege towers were some of the main attacking tools while those defending relied upon solid walls – ideally such natural defences as high ground or water – and the knowledge that if they had adequate supplies they could outlast their opponents.

An often drawn-out and low-intensity affair, this form of combat required as much cunning and patience for success as it did troops – whether that involved a Trojan Horse or mechanical siege works. Sieges have been known to last for decades, so just how do you end the stalemate?



Attackers often used siege towers to try and breach a stronghold



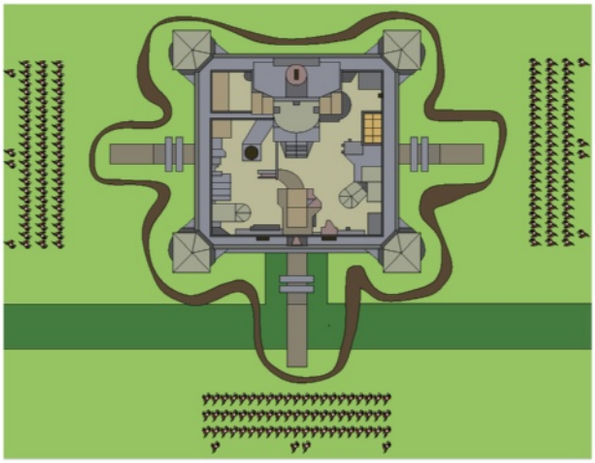


01 Surround the enemy

It's crucial when besieging a settlement to ensure that there is no way out (or, indeed, in), so the first step is to completely surround your enemy. Spreading your entire force very thin is unwise though as this makes it easier to slip by. Outposts on the main entrance/exit points will give you the upper hand and make sure no one can escape.

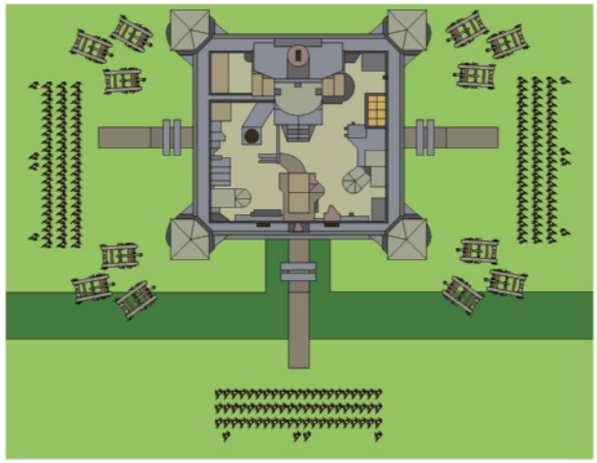
02 Cut off supplies

As well as making sure you have the entrances and exits under control, you also need to maintain a tight grip on all approaching roads, cutting off access from every direction. This will restrict food and other essential goods from entering, starting the process of lowering the inhabitants' morale and increasing desperation.



03 Dig earthworks

The final preparatory step before undertaking any real fighting was a very popular one among ancient besiegers: building earthworks to completely encircle the target. These are generally a series of banks and trenches that help to cut off water and food supplies. Done effectively, this can even lead enemies to cannibalism, as hunger mounts.



04 Ready the weapons

Standing at the bottom of a fortification's high walls, you might feel gaining access is impossible, but there are many tools at your disposal. Use extended ladders to scale the walls as well as battering rams to smash down gates. At the same time, catapults can launch projectiles into and over the walls to weaken the enemy's defences from afar.



05 Get sneaky

Like most battles, siege warfare isn't all about brute force - the most successful sieges also employ cunning and deception. For instance, try and bribe the gatekeeper to open the doors to allow your soldiers in at night without even having to take arms, or trick them into opening the gates with your own variation on the Trojan Horse.



06 Biological warfare

The final act to break morale and cause widespread death is to turn to an early example of biological warfare, using catapults to hurl diseased corpses or animals over the walls. With nowhere to run and dwindling medical supplies, the city begins to fall apart from within. Only use this as a last resort as it puts your own troops at risk too.

How not to attempt a siege

Having responded to a call by Pope Eugenius III to embark on another crusade to the Holy Land (the Second Crusade) to counter the Muslim overthrow of Edessa in 1144, the forces of Louis VII of France and Conrad III of Germany were ultimately undone attempting to take the city of Damascus in Syria. And it all came down to ill-thought-through siege tactics.

Originally deciding to attack from the west, the crusaders used the orchards on this side of the city as a food source, as well as a ready supply of wood for building weapons like towers to besiege the city. However, upon noticing that the plain on the eastern side of Damascus was far less fortified they decided that they should switch, and were soon cut off from the orchards by the arrival of enemy reinforcements. The Europeans' morale plummeted and, within days, many were refusing to fight, leaving the crusader forces no option but to abandon their siege and fall back to Jerusalem.

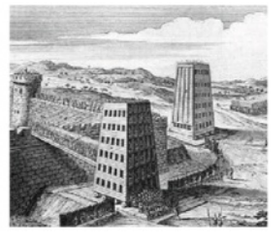


MAJOR SIEGE WEAPONS

SIEGE TOWER

GLOBAL

Combining height to scale walls with gangways to allow legions of troops into the stronghold quickly this was an effective machine used on the final assault.



TREBUCHET

EUROPE

Using the energy of a raised counterweight to fling projectiles at and over walls, these weapons could deal out a lot of damage.



GREEK FIRE

BYZANTIUM

Used by the Byzantine Empire because the additives it included made it harder to extinguish and also able to burn on water.



BATTERING RAM

GLOBAL

Designed to splinter the wooden gates on medieval forts and cities, rams could be mounted on wheels and feature protective canopies for soldiers moving it.



INSIDE HISTORY

ON BOARD A SPANISH CARAVEL

THE NEW WORLD, 15TH-16TH CENTURIES

Names like Hernán Cortés and Christopher Columbus are synonymous with great expeditions, discovery and colonial expansion, and as such the vessels used to drive their exploration remain a fascinating piece of history. These were the caravels, or caravelas, of Spain and Portugal – small, nippy ships that were able to sail into the wind and, thanks to their shallow keel, could venture much closer to coastlines and even upriver. Despite their surprisingly diminutive nature, which limited the size of the crew and cargo, this didn't limit Iberian expansion and the establishment of a spice trade with Asia – that said, larger ships were later used for the actual trading. It was the sheer manoeuvrability of the caravel that made it such a popular craft, and with the extra difficulties that came with southward oceanic exploration, this much smaller ship was better equipped to deal with the strong winds, shoals and strong currents.

Crewed by about 20-25 sailors, the caravel was based on existing fishing boats and used up to three masts to enable it to sail closer to the wind, and with greater manoeuvrability. The large square mainsail combined with the lighter hull also made the caravel exceptionally fast, meaning it could outrun almost anything else on the sea at the time.

Such advantages compensated for the lack of cargo or crew space, and indeed such was the success of this ship that the Portuguese developed a specialised fighting version of the caravel in the first half of the 16th century to act as an escort in Brazil to trade ships on the East Indies route. With a load capacity of between 50 and 200 tons the caravel wasn't well-suited to trading itself.

Having carried Christopher Columbus to the New World and Hernán Cortés to Mexico, where he would conquer the Aztec Empire, the caravel will remain a key part of naval history for ever, and here we look at some of the key features of this ship that made it such a potent tool in the age of discovery. Though the conquistadors aboard had a huge part to play in the colonisation process, they would never have made it to the shores of the New World had it not been for these modest vessels.

How a caravel sizes up

Caravel



Merchant ship



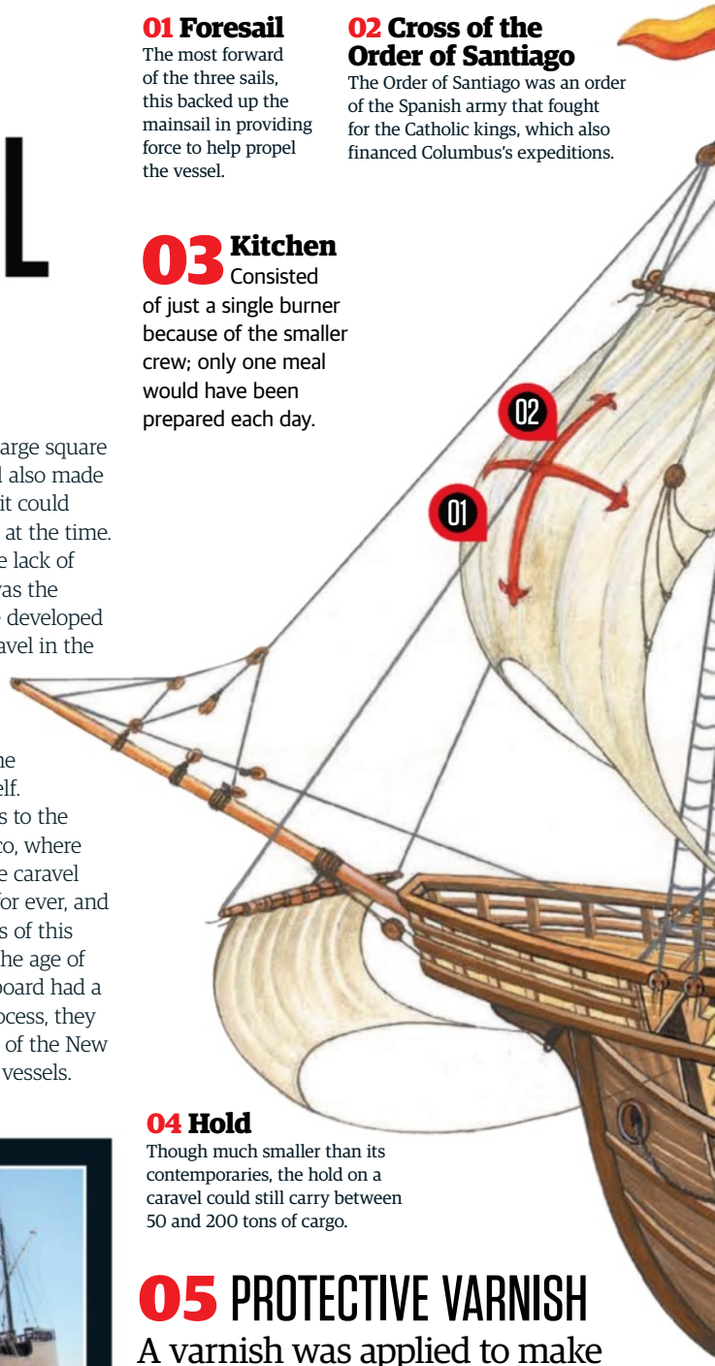
Oil tanker



01 Foresail
The most forward of the three sails, this backed up the mainsail in providing force to help propel the vessel.

02 Cross of the Order of Santiago
The Order of Santiago was an order of the Spanish army that fought for the Catholic kings, which also financed Columbus's expeditions.

03 Kitchen
Consisted of just a single burner because of the smaller crew; only one meal would have been prepared each day.



04 Hold
Though much smaller than its contemporaries, the hold on a caravel could still carry between 50 and 200 tons of cargo.

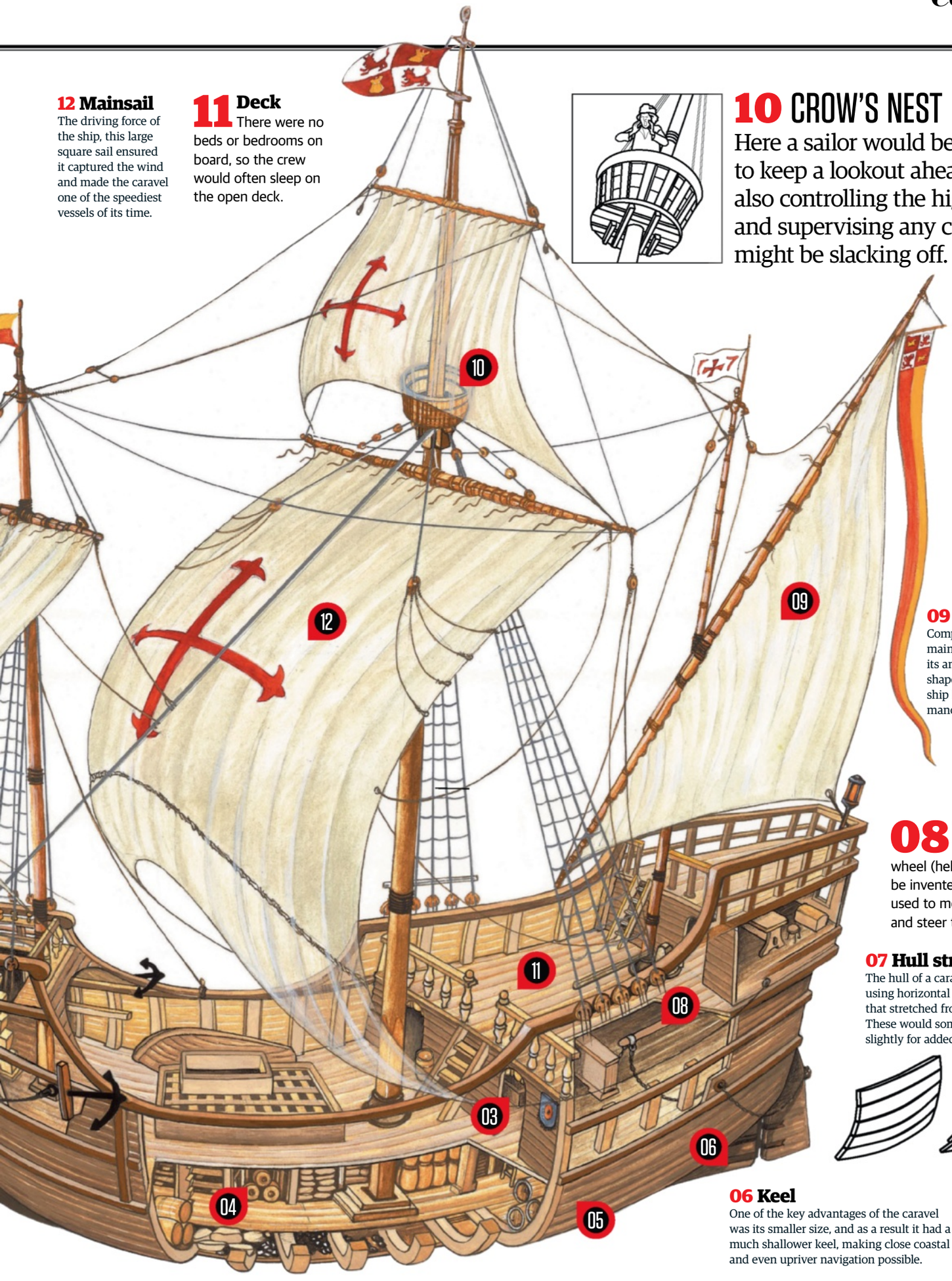
05 PROTECTIVE VARNISH
A varnish was applied to make the hull of the ship smoother and more resistant to the elements.

How do we know this?

Having shaped a huge part of history on both sides of the Atlantic, and ferried some of the most iconic names in exploration, including Columbus and Cortés, the caravel has survived history thanks to a large number of commissioned replicas – some of which are still operational today – scattered around the world. Along with shipwrecks in the Bahamas and written accounts from crew, the replicas have enabled estimates to be made about caravel scale/layout. From these accounts we can build up a picture of what it was like to sail aboard such a ship, venturing to exotic climes back in the 15th century.



A replica of Boa Esperança, which can be found in the Portuguese city of Lagos



12 Mainsail
The driving force of the ship, this large square sail ensured it captured the wind and made the caravel one of the speediest vessels of its time.

11 Deck
There were no beds or bedrooms on board, so the crew would often sleep on the open deck.

10 CROW'S NEST

Here a sailor would be stationed to keep a lookout ahead, while also controlling the high sails and supervising any crew who might be slacking off.

09 Mizzen sail
Complemented the mainsail and, thanks to its angle and triangular shape, it made the ship highly agile and manoeuvrable at sea.

08 Tiller
The steering wheel (helm) was yet to be invented, so this was used to move the rudder and steer the ship.

07 Hull structure
The hull of a caravel was built using horizontal strips of wood that stretched from bow to stern. These would sometimes overlap slightly for added strength.

06 Keel
One of the key advantages of the caravel was its smaller size, and as a result it had a much shallower keel, making close coastal and even upriver navigation possible.

© Sol90 Images, Lacobrigo

Hall of fame

10 GREAT CONQUERORS

To rule the world you need guts, determination, military savvy, political skills and a steely ambition to succeed



HERNÁN CORTÉS

SPANISH 1485-1547

Spanish conquistador Cortés took part in the Spanish conquest of Cuba in 1511. In 1519, a year after the discovery of Mexico, he persuaded Cuba's governor to let him lead a 600-strong force to this new land. On reaching the Aztec capital of Tenochtitlán, he was welcomed by its ruler, Montezuma II, and regarded as a god-king. Relations soon soured though, and by the end of June 1520 Cortés and his men were driven out of the city. The following year he returned, captured Tenochtitlán and established Mexico City on its ruins. He was made captain-general of New Spain and went on to explore Honduras and other parts of Mexico.



Mahmud of Ghazni is believed to have invaded India at least 17 times

Mahmud of Ghazni

AFGHAN 971-1030

Mahmud of Ghazni founded the Ghaznavid Empire and was the first to give himself the title 'Sultan'. His father conquered the town of Ghazni, followed by other major cities in Afghanistan. On his death, he passed the baton to Mahmud's brother, Ismail, but Mahmud overthrew Ismail's forces and went on to use his horse-mounted cavalry to conquer lands south of Afghanistan. To maintain an ever-expanding territory Hindu temples were plundered for their gold; his last major campaign was against Somnath, India, which he successfully looted. At the same time, Turkic tribes were making frequent attacks that undermined the Ghaznavid Empire.

TAMERLANE

UZBEK 1336-1405

Also known as Timur the Lame due to a limp, it was his mission to establish an Islamic Empire modelled on the Mongol Empire created by Genghis Khan. In 1398, his army invaded India and briefly occupied Delhi, which was left in ruins. The next year he waged war on the Ottoman Empire. He conquered most of central Asia, Syria, Iraq, Iran and parts of Turkey, and before his death, he even had plans to invade China.



Tamerlane was a ruthless conqueror, often burning entire cities to the ground

Sargon of Akkad

MESOPOTAMIAN UNKNOWN – CIRCA 2215 BCE

Sargon the Great founded the Dynasty of Akkad that ruled Mesopotamia for over a century. This included the territories of Syria, Asia Minor and Iran. Originally, the city-states of Mesopotamia were conquered by Lugalzagesi of Uruk, so when Sargon seized power from Lugalzagesi, he had the foundations for the Akkadian Empire already laid for him. He often had to use military force to put down internal rebellions, yet was still able to expand the empire over his 55-year reign.





Ashoka Maurya

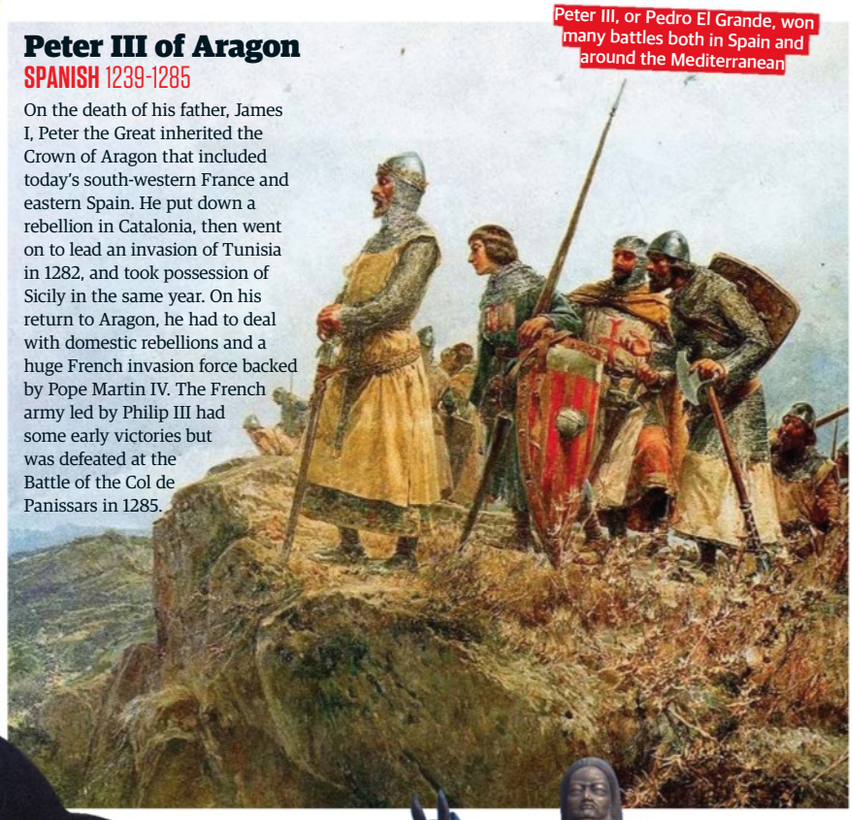
INDIAN UNKNOWN – CIRCA 232 BCE

Scholars originally regarded Ashoka the Great as a figure of legend. Around 270 BCE, after allegedly killing off his brothers, he became the third ruler of the Mauryan Empire of central India. He waged war on the borders of his territory for eight years, establishing a vast kingdom that included the majority of the Indian subcontinent, out to Burma in the east. The huge death toll of 100,000 people due to his warfare in the province of Kalinga led him to take up more peaceful Buddhist principles.

Peter III of Aragon

SPANISH 1239-1285

On the death of his father, James I, Peter the Great inherited the Crown of Aragon that included today's south-western France and eastern Spain. He put down a rebellion in Catalonia, then went on to lead an invasion of Tunisia in 1282, and took possession of Sicily in the same year. On his return to Aragon, he had to deal with domestic rebellions and a huge French invasion force backed by Pope Martin IV. The French army led by Philip III had some early victories but was defeated at the Battle of the Col de Panissars in 1285.

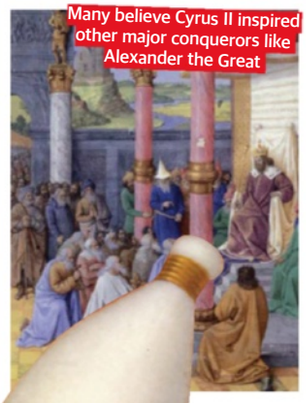


Peter III, or Pedro El Grande, won many battles both in Spain and around the Mediterranean

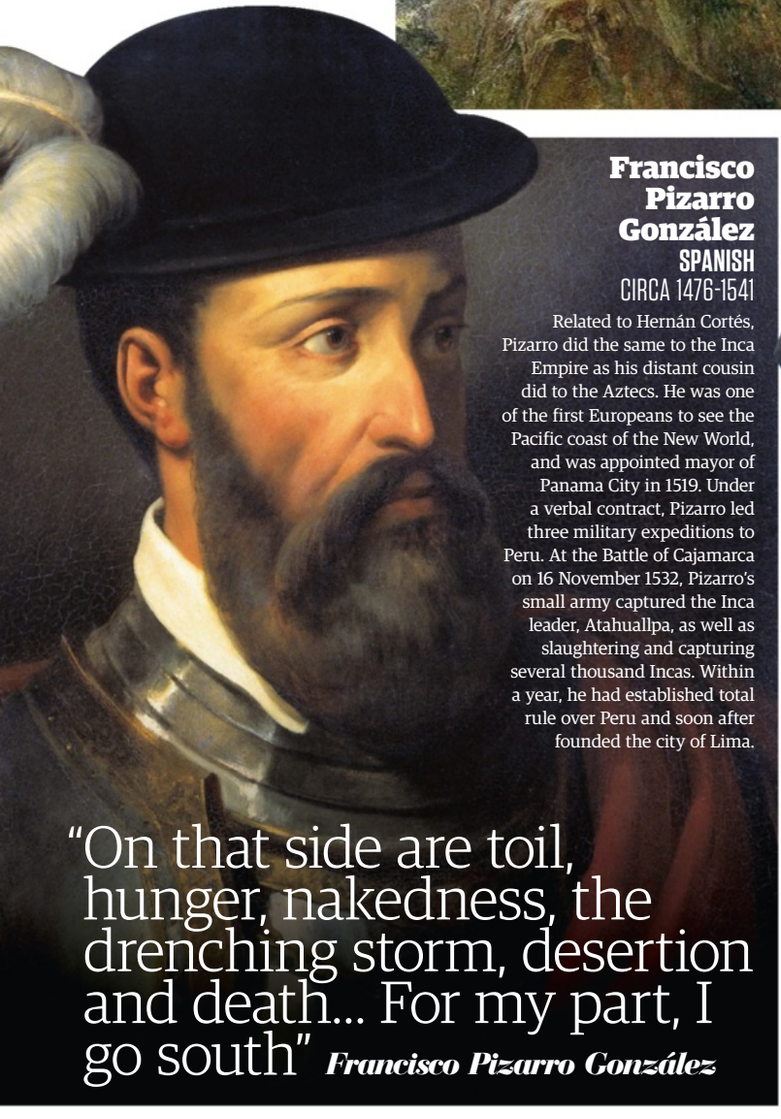
Cyrus II of Persia

PERSIAN CIRCA 580-530 BCE

Cyrus the Great created the nation of Persia by uniting the Medes and Persian tribes. He led his armies to conquer lands to the east where he built fortifications against enemy tribes in central Asia, and to the west, he conquered Babylon, Syria and Palestine. His Achaemenid Empire became the largest in the world at that time. Although he titled himself the 'King of Babylon and King of the Land', he tolerated and incorporated other beliefs and races under his rulership.



Many believe Cyrus II inspired other major conquerors like Alexander the Great



Francisco Pizarro González

SPANISH CIRCA 1476-1541

Related to Hernán Cortés, Pizarro did the same to the Inca Empire as his distant cousin did to the Aztecs. He was one of the first Europeans to see the Pacific coast of the New World, and was appointed mayor of Panama City in 1519. Under a verbal contract, Pizarro led three military expeditions to Peru. At the Battle of Cajamarca on 16 November 1532, Pizarro's small army captured the Inca leader, Atahuallpa, as well as slaughtering and capturing several thousand Incas. Within a year, he had established total rule over Peru and soon after founded the city of Lima.

"On that side are toil, hunger, nakedness, the drenching storm, desertion and death... For my part, I go south" ***Francisco Pizarro González***



Genghis Khan (Temujin)

MONGOLIAN CIRCA 1162-1227

Temujin established an army of thousands to unite the tribes in north-east Asia and create a Mongol Empire. He used networks of spies, signalling systems and a well-equipped and trained army to enable him to gain control of central and eastern Mongolia by 1206. All who opposed his forces were mercilessly slaughtered. He waged war on China, and in 1219, he led a devastating war against the Khwarezm Dynasty who ruled Persia and Afghanistan. Genghis Khan created the largest empire ever seen on Earth up to that point.



Not just a military mastermind, Thutmose III was also a savvy administrator

THUTMOSE III

EGYPTIAN CIRCA 1485-1425 BCE

Thutmose III shared the rulership with his aunt Hatshepsut for 22 years. On her death, he became the sixth pharaoh of the 18th Dynasty and led his army to the city of Megiddo, Israel. Against advice, he took his force of 10,000 men through a canyon where they could easily be ambushed. Fortunately, the army led by the king of Kadesh expected to be attacked from an easier route and, with the element of surprise, he was able to win a decisive battle. His regular military campaigns established Egyptian dominance of Syria and Palestine.

© Look and Learn/Mary Evans Picture Library/Alamy/Fanghong

Top 5 facts ALEXANDER THE GREAT

RULER OF A VAST EMPIRE AND LEGENDARY BATTLE COMMANDER
MACEDON, 356-323 BCE

ALEXANDER III OF MACEDON

Brief Bio

Born in 356 BCE in Pella, Macedon, Alexander III went on to become one of the most feared and renowned generals in history. In his relatively short life, he carved a swathe from Greece all the way through to Africa and India, creating one of the largest empires of the ancient world.

01 ARISTOTLE WAS HIS TUTOR

The legendary Greek philosopher was offered the post of Alexander's personal tutor by his father, Philip II of Macedon, in return for rebuilding his hometown of Stagira, which Philip had previously destroyed. Alexander was schooled in medicine, morals, religion, logic and art, and remained in contact with Aristotle for the rest of his life.

02 No one ever defeated him

Alexander emerged unscathed through campaigns in the Balkans, Persia, Syria and Egypt during which he subdued or conquered over half of the world then known to the Greeks. His conquest ended at the Beas River in India, when his men refused to go on.

03 He believed himself a god

During the Egyptian campaign, he took time out to embark on a pilgrimage to the Temple of Amun at an oasis in what is now Libya, where he consulted the oracle there. Whatever he heard, he came to believe the Greek god Zeus was actually his father and effectively proclaimed himself a demigod.

04 He was king aged 20

Alexander became the ruler of Macedonia in 336 BCE after his father – Philip II – was murdered by one of his own bodyguards. From then on he became pharaoh of Egypt by the age of 24, then lord of Asia and the ruler of Persia at just 25 years old.

05 His empire fell apart when he died

After his death in Babylon the resulting power vacuum led to years of civil war, in the confusion of which his plans for further conquest were abandoned. Had he lived, it was believed he would have invaded Arabia, as well as encroaching farther into Europe.

© Corbis

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It is...
A. A food grinder
B. A medical instrument
C. Part of a lamp

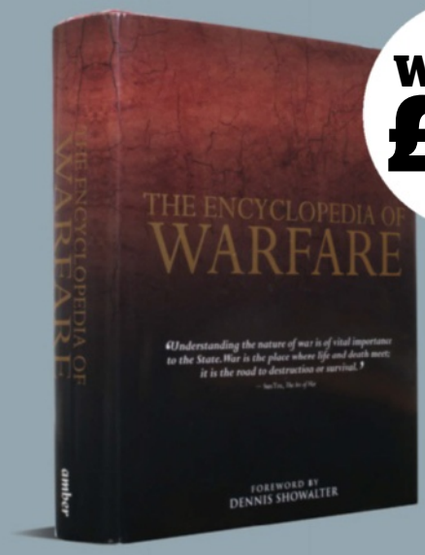


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WIN

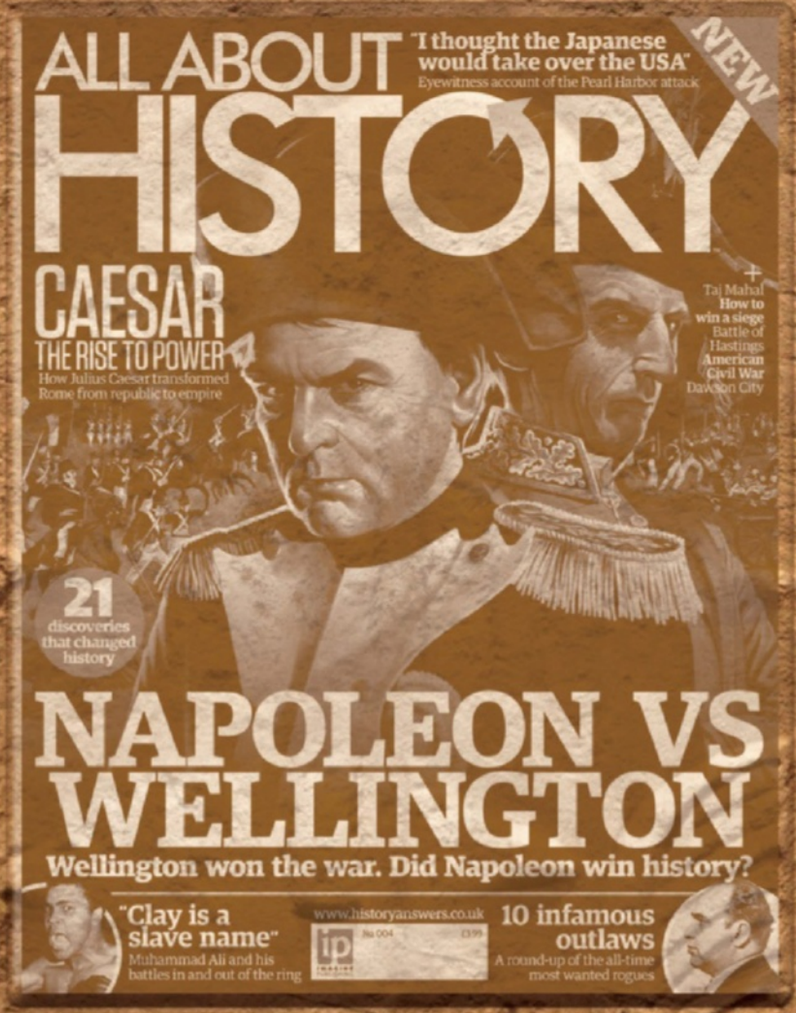
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Eye Witness

ATTACK ON PEARL HARBOR, HAWAII, USA, 7 DECEMBER 1941

Written by Jonathan O'Callaghan

WALTER CHARLES EBEL



Now 94 years of age Charles Ebel, from Guilderland, New York, was serving as a seaman first class aboard the USS Curtiss, a seaplane tender, when Japanese warplanes attacked the US naval base at Pearl Harbor. From his unique vantage point across Ford Island, Ebel saw many ships sunk in the most deadly foreign attack on American soil until 11 September 2001.

> "We expected them to come back. I thought the Japanese would take over Pearl and probably the States"

On the morning of 7 December 1941, Walter Charles Ebel and a friend were getting ready to go surfing at Waikiki Beach, totally oblivious of the horror that was heading their way.

"My buddy and I were learning to surf," said Ebel. "We'd ride these [3.6-metre] 12-foot bores and sometimes you'd be on one wave and your board would be on another, so you're just trying to catch it."

And then, in the blink of an eye, everything changed. "I was looking out the hatch [aboard the USS Curtiss] and I heard this roar, and I just saw a plane drop a bomb right onto that poor island where the planes were. And then he came back by the hatch I was standing in, so he was side on, and he had this big smile [on his face]. He went up the channel - he was looking for another target, I guess - and that was the start of it. From then on you knew it was [going to be] tough."

Ebel sprung to action. Once all hell had broken loose, his captain told him to head to the main deck to see if there was anything he could do. There was one machine gun on the deck which was unmanned. "In one flowing moment I jumped onto it and fired that for a while," said Ebel. "If there was any goal it was to stay alive."

What had started as just another day for Ebel in the idyllic setting of Honolulu in Hawaii turned out to be the scene for the greatest loss of life on American soil at foreign hands until 9/11 60 years later. Around 2,400 Americans were killed and 1,200 wounded.

In the months prior to Pearl Harbor, Ebel had been on cruisers in the South Pacific. On 6 December his ship, the USS Curtiss, had dropped gas off at Wake Island north of the Marshall Islands. A last-minute decision saw the Curtiss head for Honolulu. Upon arrival another ship had taken the Curtiss's berthing point near Pearl Harbor, so the captain ordered the ship to swing around behind Ford Island (see map). On the way the Curtiss picked up 378,540 litres (100,000 gallons) of gasoline, before berthing at night on 6 December 1941.

When the attack broke out, the Curtiss was somewhat fortunate with its position. Its berthing point was far enough away from Pearl Harbor to avoid the majority of the Japanese onslaught, however the horrors they witnessed were anything but fortunate.

As Ebel explains though, they weren't completely removed from the action. "Our ship got credit for shooting down three planes and partial credit for a submarine," he said. "When we were in battle this submarine popped up behind us, and so we fired over the top of the sub. It went down but when it came back up it let go of a torpedo and it went right by our ship

The day America was attacked

HST

3.42am **The minesweeper ship Condor spots a sub 3.2km (2mi) from Pearl Harbor and sends a warning to the USS Ward**



6.10am **183 fighters, bombers and torpedo planes take off from Japanese aircraft carriers north of Oahu**

7.02am **First sighting**
The Opana Radar Station on Oahu spots more than 50 aircraft bearing down on them, much to the incredulity of the two privates on duty

7.20am **A lieutenant incorrectly believes the planes sighted by the radar station to be US B-17 bombers, and fatally dismisses the warning**

7.40am **Japanese planes bear down on Pearl Harbor as the clouds clear**



7.55am **Airfield attack**
The Japanese first bomb the US Air Force's Wheeler Field, north of Pearl Harbor, destroying most of the US warplanes on the ground

8am **Most of a squadron of 12 unarmed American B-17s manage to land at Oahu not initially aware that Japan was attacking. One of the B-17s touches down on a golf course**

8.10am **Sinking Arizona**
A bomb hits the USS Arizona, setting off 450,000kg (1mn lb) of gunpowder and instantly destroying the ship, along with 1,177 crew on board



8.12am **The USS Utah is scuppered**

8.54am **The second wave of Japanese fighters arrives, attacking the navy yard dry dock and other ships**

10am **Third wave called off**
A third Japanese strike is rejected by superiors, believing the earlier attacks have done enough damage

1pm **The Japanese aircraft carriers head for home, with over 2,400 US soldiers left dead**

about [3.6 metres] 12 feet out. It felt like it was closer, but they always look closer in your mind. The torpedo went up the channel, I don't know where it ended up, but there was a destroyer in the channel and the submarine ran at the sight of him. It went down and never came back up again. That was the start of everything big."

As mentioned, the Curtiss had just picked up thousands of gallons of gasoline, and Ebel was all too aware of the fact that he was essentially standing on top a massive bomb: "There was a joke I always remember I said to my buddy. I asked him where he was going and he said to get a life jacket. I said, 'See if you can find me a parachute – that life jacket isn't going to be much help when that gas goes off!'" Fortunately, the gasoline never ignited and the Curtiss survived.

Ebel saw a lot of his friends perish on the Curtiss; in total 19 would die on the ship, with many more wounded. At the time though, he was forced to hide any nerves he might have. "We were all accustomed to the drills," Ebel explained, "but when you get the real thing anything can happen. I was always composed pretty well, I was only a tiny bit nervous. It's part of the battle, I guess. You just get going and do your job, that's all. What else are you going to do?"

The attack itself ignited an almost psychotic fury within some of the American soldiers, highlighted by a grisly moment aboard the Curtiss. When a Japanese dive-bomber hit a crane on the Curtiss and crashed onto the deck, Ebel witnessed first-hand the extent of his fellow compatriots' anger. "When the plane hit the crane [the pilot's] head came off and skated across the deck," states Ebel. "Our guys were vicious and they started trying to pull out his teeth with a pair of pliers. That always stood out because I was just 20 turning 21 and stuff like that bothered me. After a while you realise [the enemy is] just another person."

With the attack fully underway, the Curtiss was dealt a stroke of fortune. A bomb had shattered the mooring on the back of the ship and, according to Ebel, "We were swinging around, and that helped us because if [the planes] passed us once then when they came back [on an attack run] we might have a different position." But while they were



Sailors at Ford Island air base stand amid plane wreckage



Captured from a Japanese aircraft, this image shows several vessels on Battleship Row under fire from torpedo planes

"Our guys were vicious... they started trying to pull out his teeth with a pair of pliers. That always stood out because I was just 20"

spared the full brunt of the Japanese assault, Ebel had an unwanted vantage point of what was happening around the rest of the harbour.

"The sky was full of them - they were like bees," recalls Ebel. "There were planes everywhere. This torpedo plane went right by us and sunk the USS Utah, and I saw when they dropped a bomb on the USS Arizona; it went right down the smoke stack and it blew it right out of the water." The surprise nature of the raid was the main reason so many of the ships would be sunk, according to Ebel: "The Japanese got to our ships with the watertight doors all open - that's why they sunk them, otherwise you couldn't. They could shoot the whole top of a ship away and it still wouldn't sink because they've got watertight doors like air pockets, and that's what keeps them afloat."

But as suddenly as the attack had begun that morning, around an hour later "they stopped all at once". Ebel and his crew, however, as you'd expect, remained on high alert. Some, including Ebel, even anticipated that Pearl Harbor was only a precursor to an invasion of the American mainland. "We expected them to come back," said Ebel. "I thought the Japanese would take over Pearl [Harbor] and probably the States.

"I always figured they could take the US over easy because they had the most aircraft carriers of anywhere in the world, and all they had to do was send one to Seattle and one to San Diego and nobody could stop them because [the US military was mostly] in Hawaii or other places. We never had much protection [in the USA during WWII]. They made a big mistake [in not coming back to take Pearl]; they lost the war right there. They might have won it. I don't know if they could have kept Hawaii or not, but if they'd gone to the States it would have been a different story. I'm glad they didn't."



Over 1,100 US Marines were killed on the USS Arizona

For many of the Pearl Harbor survivors, the eventual Allied victory in the war four years later brought little consolation for what had happened on that tragic day. "I just feel sorry for all those people that got killed," Ebel tells us. "There was a cemetery up on a hill there in Hawaii. They used to dig these big long trenches and all these bodies sewn up in canvas bags would just get dropped in and they'd put up a cross. They didn't know who they were. It went for as far as you could see. I remember that - it never goes away. In the back of your mind, it's always there. I wish I didn't see it but I did."

The attack on Pearl Harbor took place over seven decades ago, and thus many of the survivors have since passed away. Those remaining though, like Ebel, are still struggling to come to terms with the events of that winter's morning in 1941. "It doesn't prey on my mind all the time like it used to," he said. "I used to walk down the street and somebody would slam a car door and I'd jump. Not any more. I don't have any nightmares about it like I used to. But you never get over it."

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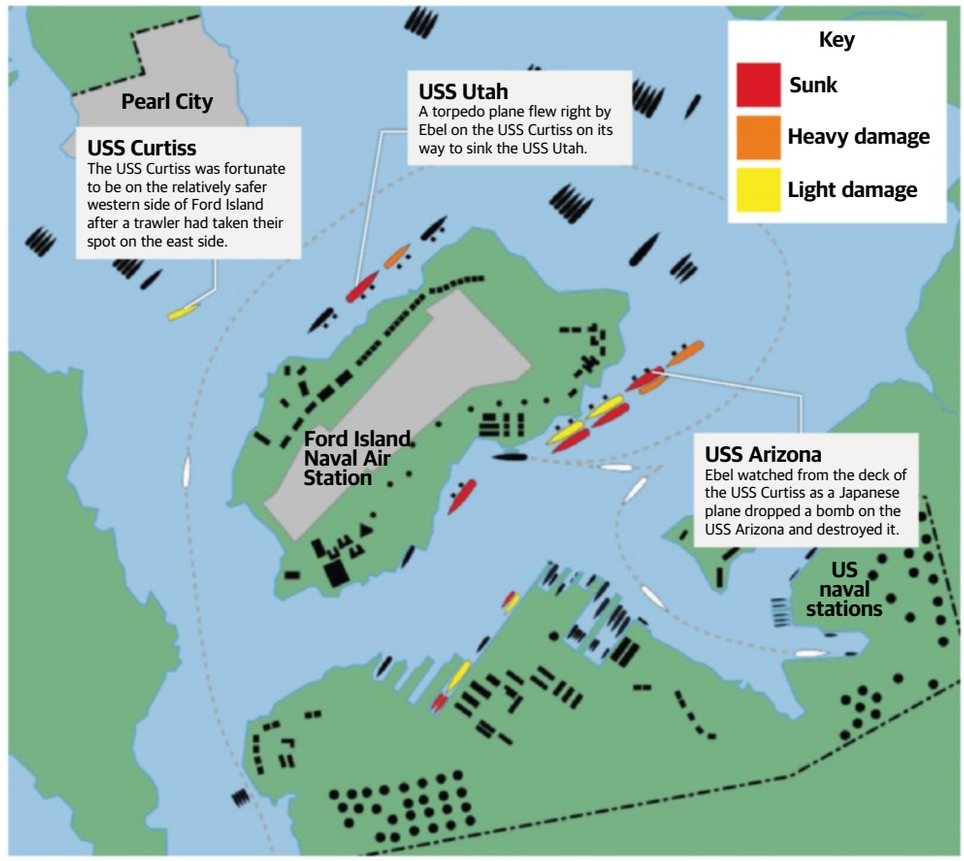
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Origins and aftermath

The attack on Pearl Harbor was a shock to America. Despite the country's reluctance to enter into World War II, the Japanese had feared America would at some point join the Allies and, in an effort to quell their expected entrance into the global conflict, they intended to cripple the US Pacific Fleet to ensure they would not pose any threat to Japan in South-east Asia. The plan, however, failed to quell the US and instead only achieved the result of incurring the full wrath of the American military, which the Japanese would feel the brunt of culminating in the two atomic bombs dropped on Hiroshima and Nagasaki in 1945. For all those at Pearl Harbor, it was a terrifying experience that has stayed with them ever since.



The atomic bombs used on Japan were one major consequence of Pearl Harbor



© Michael P Farrell/Times Union

Bluffer's Guide
American Civil War

USA 12 APRIL 1861 – 10 MAY 1865

What was it?

The American Civil War was a conflict between the 11 Confederate states who sought independence from the remaining Northern and other loyal states. The key issues causing division between the North and South were state rights, the economy and – tied up in both of these – the abolition of slavery.

How did it start?

Tensions between the largely industrial North and agricultural South had been rising, but the election of Abraham Lincoln as president on a platform of keeping slavery out of the new territories tipped the balance. Before he even took office in March 1861, seven Southern states had seceded from the Union.



Where did they fight?

Some of the biggest battles were fought in Pennsylvania, Georgia, Virginia, Maryland and Tennessee, although conflict reached many corners of the USA. It didn't quite reach the north-east heartland of the Union though.

The Battle of Gettysburg

Also known for Lincoln's Gettysburg Address, this small borough of Pennsylvania was the ground for one of the bloodiest confrontations of the Civil War. Casualties from Gettysburg are estimated to have been around 51,000 – that accounts for around eight per cent of all casualties during the four-year conflict.

The first industrial war

The American Civil War is considered to be the template for many subsequent industrial wars that would follow. It became characterised by large-scale conscription of the civilian population, use of railroads and other fast transportation for troop deployment, and communication by telegraph and wireless devices.

The end of slavery

The Emancipation Proclamation was an executive order issued by President Lincoln on 1 January 1863, freeing slaves in the Confederate states. It paved the way for the 13th Amendment, which was passed by the Senate in April 1864 and ratified in December the following year, abolishing slavery nationwide.



The signing of the Emancipation Proclamation at the start of 1863



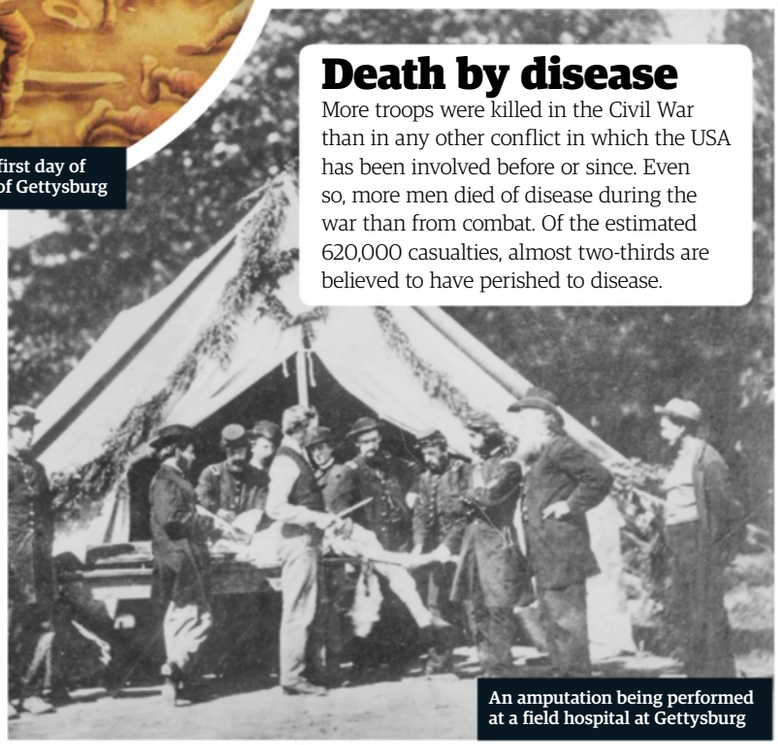
An illustration of the first day of fighting at the Battle of Gettysburg

Union vs Confederacy

The Union, ie Northern States, was made up of 20 free states and five border slave states and stood against 11 Southern slave states, making up the Confederacy. It has been estimated that the forces on each side numbered around 2.13 million Union troops against 1.08 million Confederate troops.

Death by disease

More troops were killed in the Civil War than in any other conflict in which the USA has been involved before or since. Even so, more men died of disease during the war than from combat. Of the estimated 620,000 casualties, almost two-thirds are believed to have perished to disease.



An amputation being performed at a field hospital at Gettysburg



Lincoln's assassination

On 14 April 1865, as the Union celebrated victory, President Lincoln was shot and killed by actor John Wilkes Booth while attending Ford's Theatre, Washington DC. Lincoln was pronounced dead at a nearby guesthouse at 7.22am on 15 April.

Key figures

Abraham Lincoln
1809-1865
A Kentucky-born congressman for Illinois, Lincoln was a lawyer before running for president.

Robert E Lee
1807-1870
General and commander of the Confederate army, he was actually offered command of Union forces first.

Ulysses S Grant
1822-1885
Lieutenant general during the Civil War, Grant was later elected president, holding office from 1869 to 1877.

Jefferson Davis
1808-1889
Confederate president during the Civil War, he was captured but freed after two years without facing treason charges.

John Wilkes Booth
1838-1865
The assassin who killed Lincoln at Ford's Theatre had originally plotted only kidnap before changing the plan to murder.

Major events

Lincoln elected
6 November 1860
Abraham Lincoln wins a very divisive election despite receiving no support from a single Southern state.

Confederacy formed
8 February 1861
The Confederate States of America is formed by six of the seven secession states.

Fort Sumter attacked
12-14 April 1861
The Battle of Fort Sumter near Charleston, South Carolina, and its surrender mark the first engagement of the Civil War.

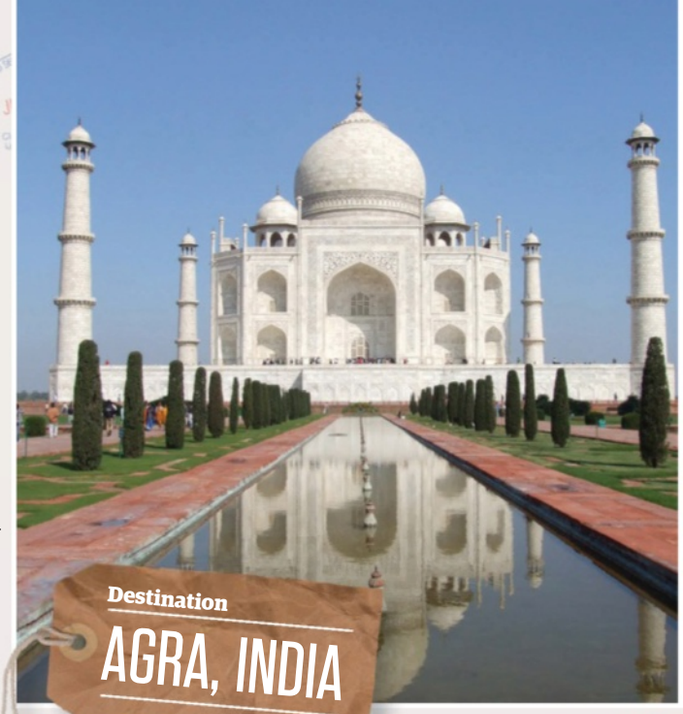
Emancipation Proclamation
22 September 1862
Lincoln announces a preliminary proclamation stating his aim to free Southern slaves, making abolition the focus of the war.

Gettysburg
1-3 July 1863
Described as the turning point of the war, the Battle of Gettysburg is also the bloodiest confrontation of the conflict.

Tour Guide
Taj Mahal

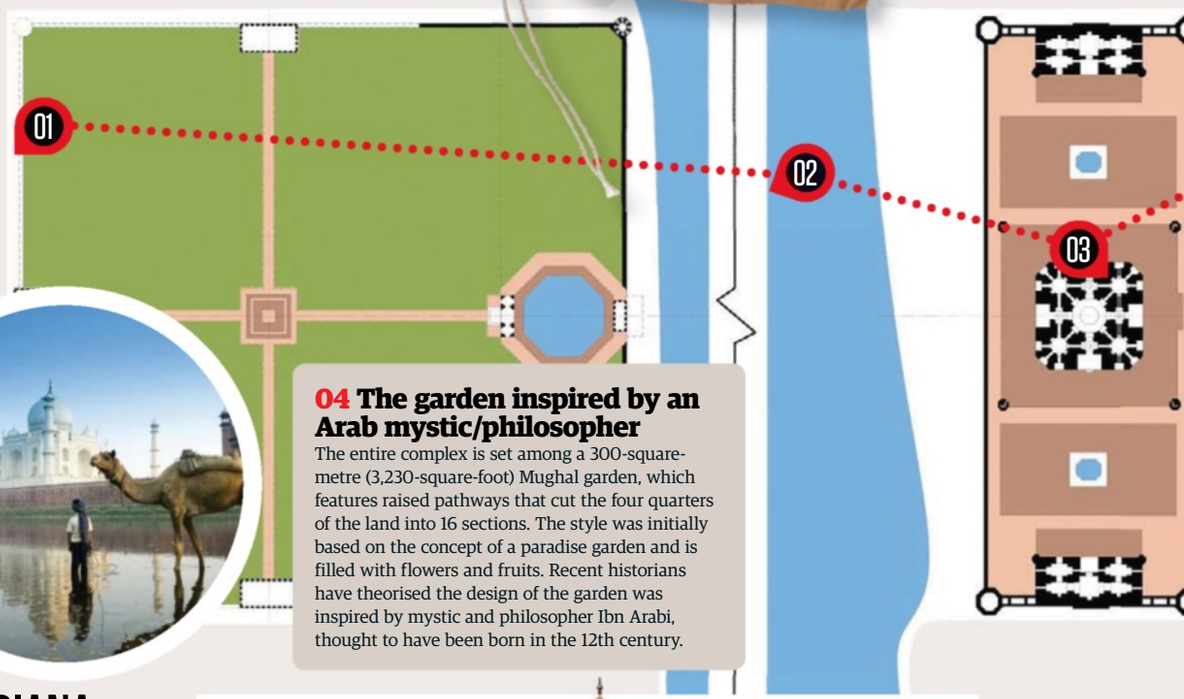


Take a trip around a beautiful World Heritage Site, visited by over 15,000 people a day, which was built in honour of a shah's beloved late wife



Destination
AGRA, INDIA

01 The gem-filled walls that soldiers plundered
The walls surrounding the Taj Mahal were originally filled with precious stones that some British soldiers and government officials took during the Indian Rebellion of 1857. Resentment had been mounting against British rule and came to a head that year in several different parts of the country. This rebellion was a major turning point in Indian history and sowed the seeds for the eventual independence of the nation which came in 1947.



02 Shaky foundations
A decline in the water levels of the Yamuna River next to the Taj Mahal – reported to be decreasing by 1.5 metres (five feet) a year – have led to concerns over the tomb's structural integrity, with cracks appearing in 2010. There are some fears it could collapse within five years if the issue is not addressed.

04 The garden inspired by an Arab mystic/philosopher
The entire complex is set among a 300-square-metre (3,230-square-foot) Mughal garden, which features raised pathways that cut the four quarters of the land into 16 sections. The style was initially based on the concept of a paradise garden and is filled with flowers and fruits. Recent historians have theorised the design of the garden was inspired by mystic and philosopher Ibn Arabi, thought to have been born in the 12th century.

03 WHERE PRINCESS DIANA WAS PHOTOGRAPHED

During her official trip to India in 1992 with Prince Charles, Princess Diana was pictured sitting alone on a bench outside the monument. It later emerged that their marriage was struggling and, as they separated later that year, the image of Diana sitting alone has taken on extra significance and relevance for some. The bench has now become a tourist attraction in its own right and is regularly filled by those re-creating the famous pose.





Construction of the Taj Mahal

Work began on the Taj Mahal in 1632 as a monument to grief-stricken Mughal emperor Shah Jahan's third wife, Mumtaz, who had died during childbirth. The entire complex (including the outlying buildings and ornate gardens) was not completed until 1653 and involved a team of 20,000 labourers with 1,000 elephants being used to transport materials from around India and more remote parts of Asia. The structure broke with tradition by using vast quantities of white marble inlaid with precious stones instead of traditional red sandstone (as used to construct the nearby Red Fort which was first Jahan's palace and then later his prison). The reason that the colour of the Taj Mahal appears to change dependent on the time of day is because the structure was built to reflect light.

10 WHERE THE SHAH WAS IMPRISONED

This is a good spot to view the Red Fort behind the Taj Mahal. The fort is where Shah Jahan lived for his final eight years as a prisoner. He had been defeated in battle by one of his sons, Aurangzeb, in 1657 and was forced to live out the rest of his days here.

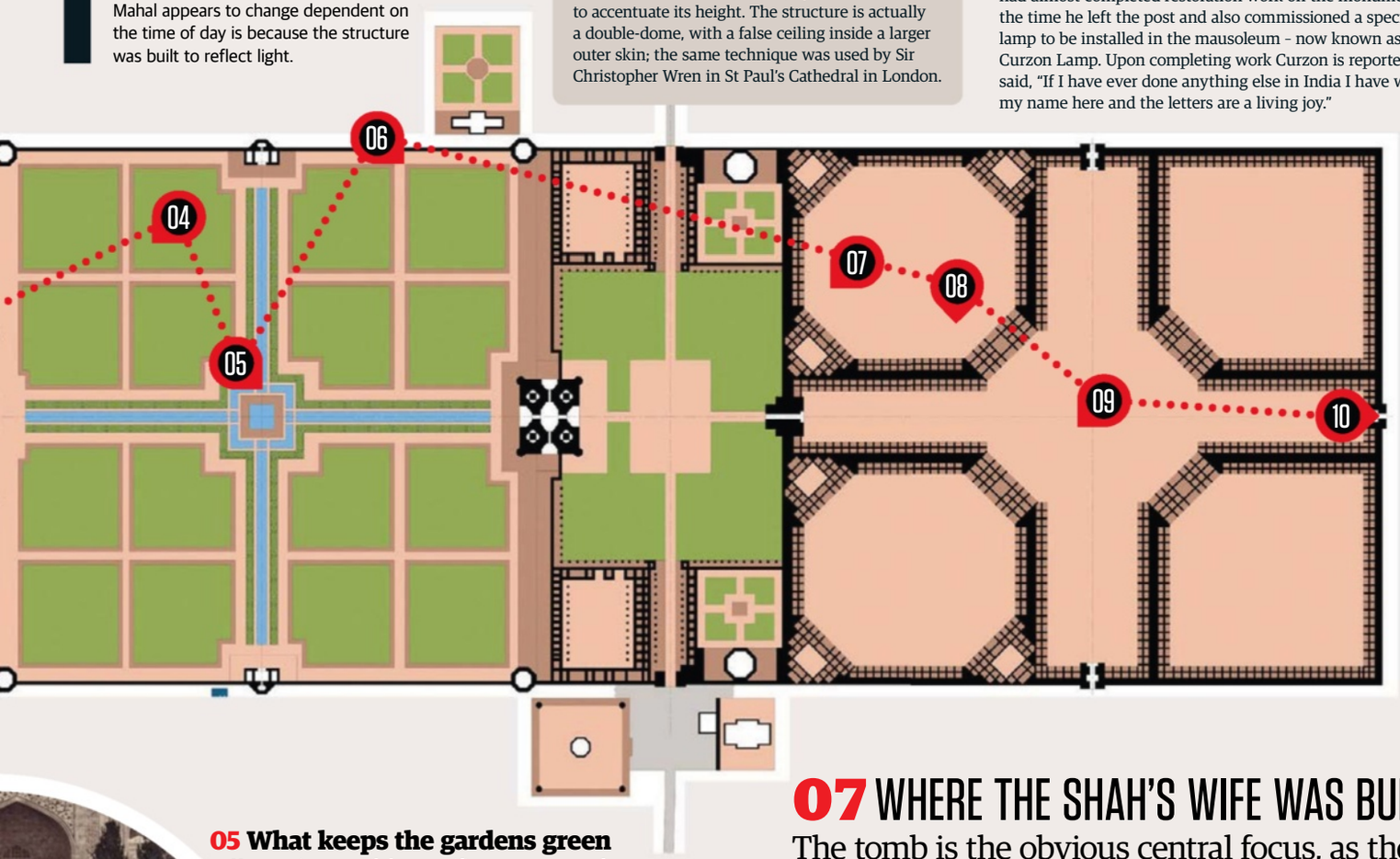


08 Lord Curzon's brass lamp

Lord George Curzon, the Viceroy of India from 1898 to 1905 (pictured right), had almost completed restoration work on the monument by the time he left the post and also commissioned a special brass lamp to be installed in the mausoleum – now known as the Curzon Lamp. Upon completing work Curzon is reported to have said, "If I have ever done anything else in India I have written my name here and the letters are a living joy."

09 The centre piece

Arguably the most recognisable aspect of the Taj Mahal, the dome is 35 metres (115 feet) high and sits on a seven-metre (23-foot) cylindrical tower to accentuate its height. The structure is actually a double-dome, with a false ceiling inside a larger outer skin; the same technique was used by Sir Christopher Wren in St Paul's Cathedral in London.





05 What keeps the gardens green

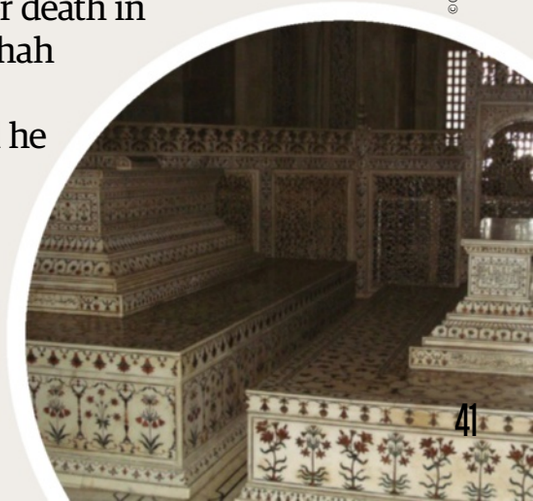
Not wanting to spoil the magnificent appearance of the gardens with pumps, an underground pipe system was implemented. Water was drawn from the river by a series of animal-powered rope and bucket devices and deposited into a large storage tank where it was then distributed, including to the water feature – a centrepiece of the garden.

06 Protection from the Luftwaffe

During World War II scaffolding was erected around the buildings in 1942 in an attempt to protect it from bombing raids from the Luftwaffe and then the Japanese air force. The monument emerged from the conflict unscathed, but was almost damaged when a C-87 American military transport aeroplane (notorious for their poor climbing capacities) almost crashed into it after takeoff from a nearby airstrip.

07 WHERE THE SHAH'S WIFE WAS BURIED

The tomb is the obvious central focus, as the initial reason for the building was as a final resting place for Shah Jahan's wife, Mumtaz Mahal. Mumtaz was laid to rest in the tomb six months after her death in January 1632 and Shah Jahan joined her in 1666 – but not until he had been defeated in battle, usurped by one of his sons and condemned to house arrest.



© Getty

What if...
Britain had won the War of Independence?

THE AMERICAN REVOLUTION, NORTH AMERICA, 1775-1783

Interviews by Matt Bennett

PROF STEPHEN CONWAY



Stephen Conway is a professor of history in the History department at University College London. His teaching focuses on 18th-century British and colonial American history and his publications include *The British Isles And The War Of American Independence* (2000) and *A Short History Of The American Revolutionary War* (2013).

PROF EMERITUS JOHN FERLING



A specialist in early American history, John Ferling has written several books around this subject area, such as *Struggle For A Continent: The Wars Of Early America* (1993) and *Almost A Miracle: The American Victory In The War Of Independence* (2007).

PROF ROBERT ALLISON



Robert Allison has taught American history at Suffolk University in Boston, MA, since 1992, when he earned his doctorate in the History of American Civilisation at Harvard University. He chairs Suffolk's History department and also teaches history at the Harvard Extension School. His books include *The American Revolution: A Concise History* (2011) and *The Boston Tea Party* (2007).

What if Britain had won the American War of Independence?

SC: The American colonies would have remained in the British Empire, at least for the time being. Perhaps the colonies would have reconciled themselves to a restoration of British control and gradually have moved towards greater home rule and eventual independence in the same manner as many countries in the later British Commonwealth. But it's equally likely that the rebellion might have flared up again in a few years, or the British government might have taken the view that it was far too expensive to maintain a large army of occupation in the conquered colonies and de facto independence would have been granted.

Is it likely that victory for Britain would have merely delayed American independence? Or could the USA still be part of the Commonwealth today, like Canada?

RA: Either one is possible. [Benjamin] Franklin thought that independence would come naturally; he anticipated something like the British Commonwealth. He thought it would be impossible, when the American population was far greater than the population of England, for the government of America to continue to be administered in London.

JF: Franklin thought America's population would surpass that of Great Britain by the middle of the 19th century, and he based his calculation on natural increase alone. When immigration is factored in, America was certain to have had a far larger population by 1850. I don't see how London could have avoided extending far greater autonomy to the Americans [over] the course of the 19th century.

What might have become of the 13 colonies post-war had Britain been victorious, as well as revolutionary leaders like George Washington?

SC: The leaders of the rebellion might well have been treated in the same manner as the leaders of the rebellion of 1745-6 in Scotland, who were executed for treason.

JF: If Franklin is to be believed, the British public was enraged toward the colonists at the time the war broke out; years of war only stoked those passions. Had the rebellion been crushed, retribution would have been the order of the day. Some leaders would have been executed, some imprisoned for long terms, and the colonists likely would have had to pay fines or faced some sort of economic punishment.

And what do you think would have happened to the rest of America – beyond the 13 colonies?

JF: The French Revolution might have been America's opening for attempting once again to gain independence. But assuming that had not been the case, I think London would have continued pushing towards the west. It almost certainly would have taken the British longer to reach the Pacific than it took the United States. British merchants looked askance at settlements beyond the Appalachian barrier, but Britain would have gotten there eventually.

RA: Spain claimed the territory west of the Mississippi [River], but hardly controlled it. Britain probably would have kept the Native Americans of the Ohio Valley and the territory that is now Alabama and Mississippi, as they were trading partners. This might have stymied the spread of American settlers to the west. Then again, it might not have, as the Royal Proclamation of 1763 had not done so.

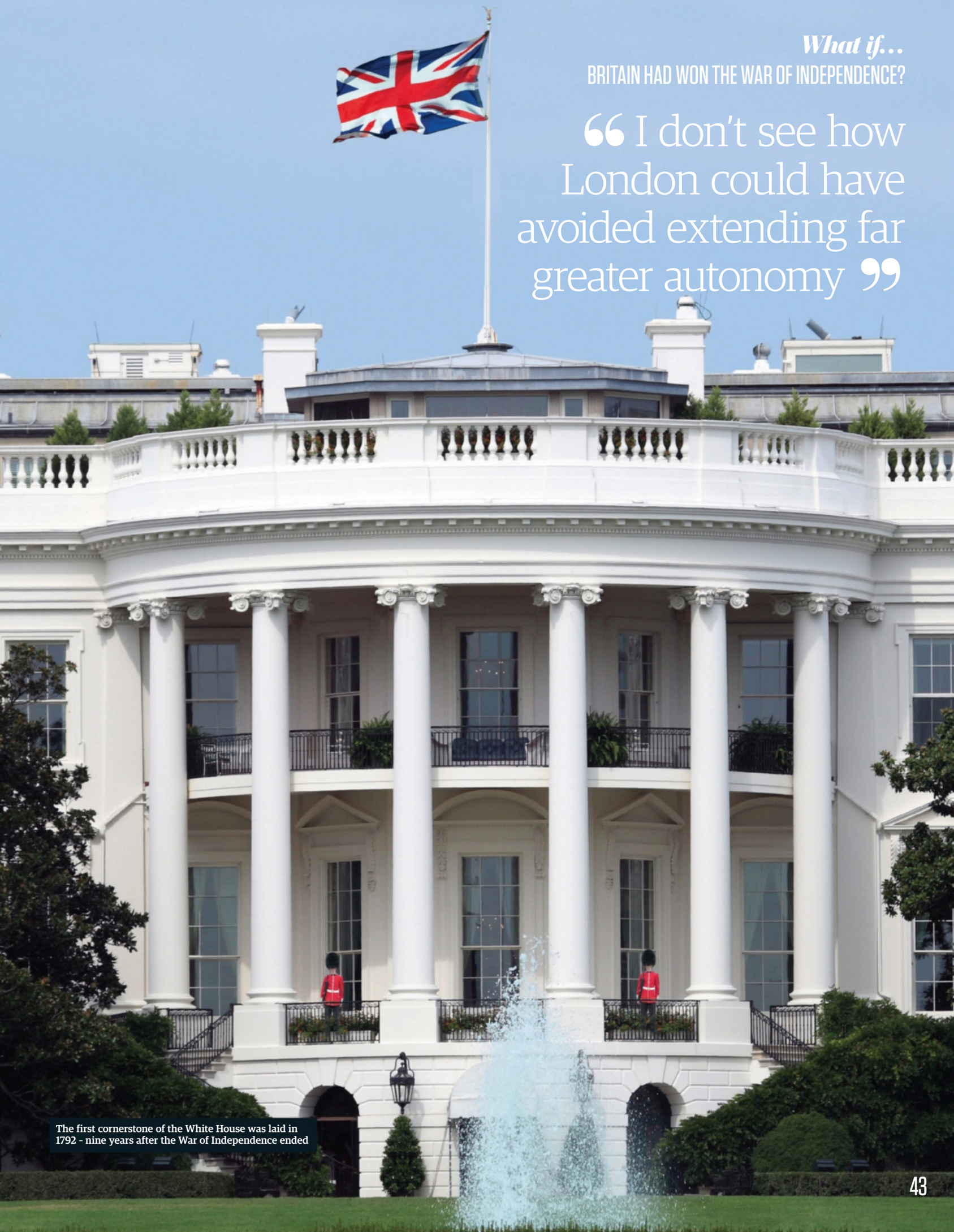
The real impetus for American settlement of the Great Plains – the area between the Mississippi River and the Rocky Mountains, much of it wrested from Mexico in the [mid-19th century] – was to connect the east coast with the west. In the 1840s the United States and Britain nearly went to war over what is today British Columbia [in Canada]; '54°-40 or Fight' was James K Polk's campaign slogan in 1844 [before he became the 11th US president]. Britain, with its naval superiority, would have controlled the American west coast.

Spain would have been squeezed out. It's not clear if Mexico or the other Latin American countries would have developed in the same way had there not been an independent United States in North America.

What benefits – or disadvantages – might victory have brought Britain?

SC: The benefits, if such they were, would have taken the form of greater economic control of the colonies, and especially of their overseas trade, which was subject to the restrictions of the 17th-century English Navigation Acts. But that advantage was unlikely to have been very much greater than the British

> “I don't see how London could have avoided extending far greater autonomy”



The first cornerstone of the White House was laid in 1792 – nine years after the War of Independence ended

"Hatred would have burned more deeply in a defeated America"

reaped from defeat. The independent United States remained in a semi-colonial economic relationship with Britain for many years after 1783, consuming vast quantities of British manufactured goods and sending to Britain enormous quantities of raw materials. Had the British won the war, they would have been burdened by the costs of governing and defending America, so we can say that defeat left Britain with many of the benefits but few of the costs of empire.

JF: A great challenge would have been to somehow win back the hearts of the colonists. It would not have been easy. A victorious America largely hated the British for a century after the Revolution. Hatred would have lingered longer and burned more deeply in a defeated America.

How might nations, other than Britain and the US, have been affected if the war had gone the other way?

RA: France, Spain and Native Americans [would have been] most notably [affected]. France supported the Americans, but primarily as a way to weaken Britain and protect France's West Indian colonies. Would the French Revolution have happened without the successful example of the American Revolution – or the huge debt France incurred by [participating in] it? Granted, France was reeling from an ineffective government overladen with aristocracy and political inefficiency, and the defeat in the Seven Years' War. Spain was fortifying its Mexican borders in the 1770s and 1780s; its main interest in the war in America was to get back Gibraltar.

The Native Americans were the big losers in the war though. The British were their allies, though allies the British sold out when it served their interests. I'm not singling out the British for doing this, as most nations tend to seek their own self-interest. The British had proposed an Indian buffer state in the Ohio Valley, and they were trading partners with the Iroquois, Creek and Cherokee tribes – one reason they supported the British rather than the Americans.



The Battle of Nassau was an American naval assault on the then British-ruled island in the Bahamas which took place in March 1776

Could a one-nation unification with Canada have been on the cards for North America?

SC: The Americans tried to conquer Canada in 1775, and wanted it ceded to the United States in the peace negotiations of 1782-3. But the British were determined to keep Canada, which was now increasingly gaining the Protestant population British governments had wanted since 1763, thanks to the exodus of American loyalists from the USA. If America had lost, then the loyalists may have stayed in the old British colonies, leaving Canada overwhelmingly francophone and Catholic, in which case it would have remained very different from the rest of the mainland British colonies.

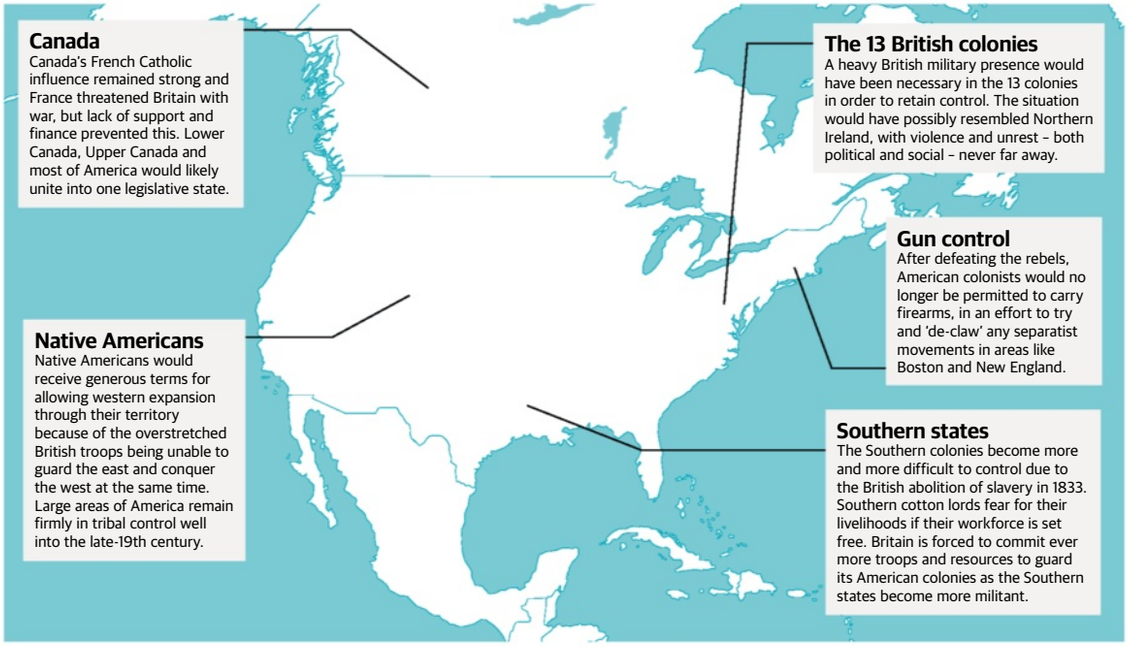
JF: I think Britain would have opposed unification, at least for a very long time after it crushed the American rebellion. During the Seven Years' War it had sought to keep the 13 colonies from unifying under one government, as Franklin had proposed in his Albany Plan of Union. Had it defeated the colonists in the Revolutionary War, Britain might have divided some colonies to keep them weak. Furthermore, the changes it sought to impose in Massachusetts' government in the Coercive Acts in 1775 probably would have been the rule of thumb in every colony.

How would it be different?



Do you think Australia would have still been developed as a penal colony if the 13 American colonies had remained under British control?

SC: New South Wales in Australia was established as a penal colony, but if the North American colonies had remained British, there would have been less incentive to ship convicts so far. America was the cheaper option by a long way. Incidentally, the idea of imprisonment and reformation of convicts would have suffered a blow, as it was the end of transportation to the American colonies that provided an opportunity for reformers who argued that criminals should be incarcerated and improved, rather than executed or exported. More broadly, we can say that the loss of America saw a shift in British imperial focus towards the East – especially Asia. This so-called 'swing to the East' has perhaps been exaggerated, but there was undoubtedly a recalibration of imperial priorities. That said, expansion in India had already started, and would probably have continued, though not perhaps at the same pace.



RA: Probably. Britain's real colonial interests in the 1770s were not America, but India, Jamaica and Barbados. And so Britain wanted control of sea routes to India, and also direct trade with China. Australia would be useful to both.

If Britain had retained control of America, how might this have impacted 20th-century events like WWI?

SC: If we assume that the British had won the war, and the colonies had remained subject to the British crown, they would no doubt have entered World War I in the same manner as the British Dominions in 1914. Whether that would have tilted the balance in favour of the Allies and against Germany/Austria-Hungary is impossible to say; maybe a still-dependent America would not have industrialised so quickly and its population would have been smaller, with the result that the addition of strength was nowhere near as great as it was in 1917-18 [when they actually entered WWI].

JF: My understanding is that Britain made a concerted effort to smooth relations with the US beginning around 1890, which proved helpful during World War I. How that war would have been seen in an America that was tied to Britain as colonies or in a Commonwealth arrangement is difficult to know. Canada did not need any prodding to back London in 1914. However, there was a deep strain of resentment in America in 1776 (one can find it in Thomas Paine and Benjamin Franklin) at the colonies having been dragged repeatedly into that 'old rotten state's plundering wars' (Franklin). Such a sentiment might only have hardened over time and, as for many in Ireland, a European war might have been the spark for many Americans to rise up in favour of breaking away from Britain.

Have your say

Do you agree with our experts' views?

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Washington for the win
George Washington carries out a surprise attack on the British contingency at Trenton, NJ. The Patriots claim a decisive victory, boosting morale.
1776

British surrender
The British army surrenders at Yorktown on 19 October 1781. In February of the following year, the British government decides to abandon the war.
1781-1782

Another war
The USA declares war on Britain, reopening the conflict. The prior conflict has overshadowed the 1812 War, but *The Star-Spangled Banner* anthem dates from this time.
1812-1815



US enters WWI
Having preferred a policy of neutrality, and with concern for trade with Britain in mind, America enters WWI, and US soldiers fight alongside the Brits.
April 1917

Battle of Long Island
Sir William Howe, C-in-C of British forces, claims victory at Long Island. The Americans try to escape to Manhattan, but the British cut them off. George Washington is killed.
27 August 1776

Britain faces new enemy
Support for America grows in Europe, particularly in France, and on 10 July 1778 France declares war on Britain. The French navy plays a key role.
1777-1778

Penal colonies
The 13 American colonies along the Atlantic coast serve as the main destination for UK transportation. Far fewer convicts are sent to Australia.
1790

France invades Spain
King Louis XVIII, angered by what was seen as Spain's gross betrayal in selling 'French' Louisiana, orders the invasion of Spain, but retreats when Britain weighs in.
1823

American population booms
Controlled immigration into British North America has gradually increased, with transportation of criminals to both America and Australia ending in 1868.
1868

Anglo-American Agreement
This pact officially ends the war. Patriot supporters who don't flee are imprisoned or hung, including key leaders like John Adams and Benjamin Franklin. Britain goes on to cement her hold of the colonies.
1776



Louisiana purchase
With France effectively bankrupted by its support for the American Revolutionary War, Spain is courted by the British government and persuaded to release Louisiana. Britain purchases the territory at a discount.
1803

Act of union
Lower Canada, Upper Canada and the American colonies are united into British North America. The British government appeases the French by granting trade with the regions that France had ceded.
1840-1867



What was it like?
DAWSON CITY 1898

Government
Before the rush, the miners enjoyed a large amount of autonomy, but on 13 June 1898 the Yukon Territory Act brought the area under central jurisdiction. This gave the commissioner of the Yukon near-absolute powers along with a council of six members.

Society
Dawson's remote location bred an intrinsic distrust of newcomers and foreigners, referred to as 'cheechakos', among the long-term residents, known as 'sourdoughs'. The native Hän people were greatly affected by the rush and some displaced.

The main street running through Dawson City



The media was quick to whip up further gold rush fever over Dawson

Media
The Klondike Nugget launched in the form of a single typed sheet of paper fastened to a post. The *Nugget*'s main rival, *The Yukon Midnight Sun*, was technically the first paper to roll its presses though, as the *Nugget*'s machinery was still en route to the city.

Finance
The vast wealth that the prospectors brought to Dawson caused a major inflation in prices, as business owners looked to profit. The government sought to profit too, so all gold was taxed. By the end of the rush $1.53 million had been collected in taxed gold.

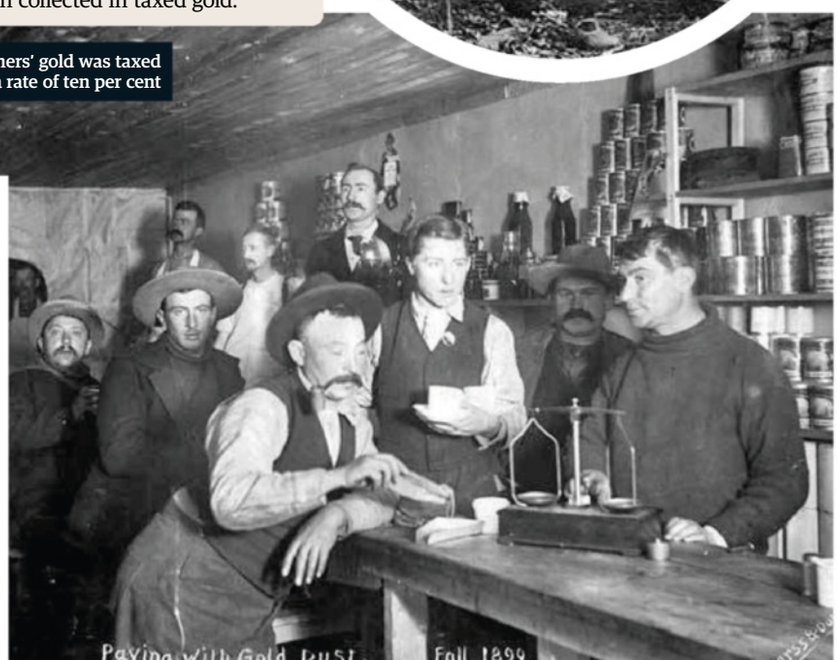


Miners' gold was taxed at a rate of ten per cent

Education
As Dawson's population grew, private schools were established, initially by rival religious sects. Many smaller schoolhouses also sprung up around the gold creeks, so miners' children could have access to some education. A public school didn't arrive until 1901.

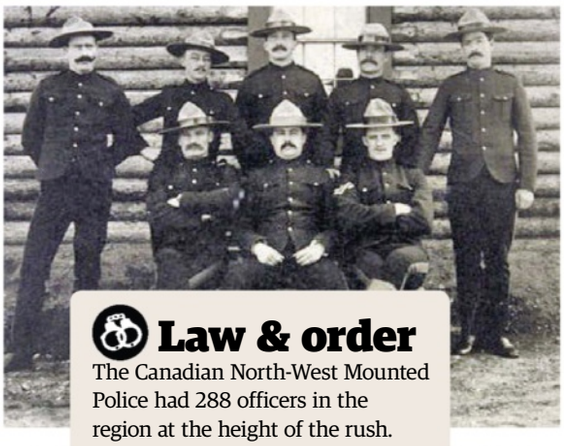
A typical miner's family sitting outside their cabin





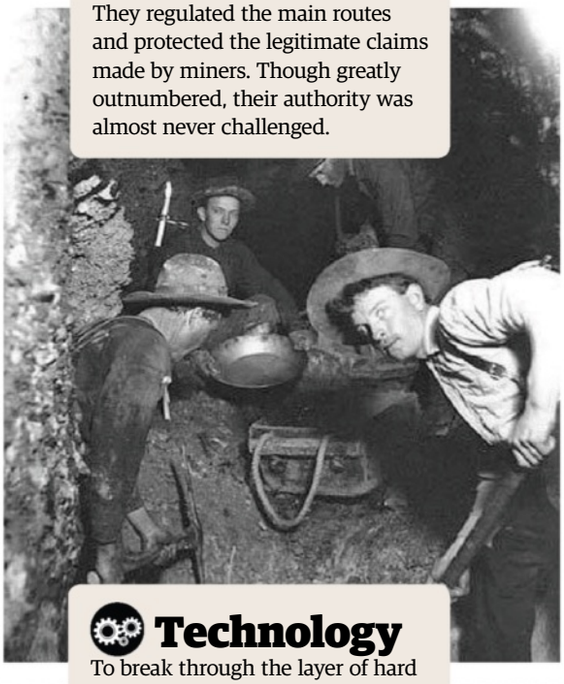
What was it like?

DAWSON CITY 1898



Law & order

The Canadian North-West Mounted Police had 288 officers in the region at the height of the rush. They regulated the main routes and protected the legitimate claims made by miners. Though greatly outnumbered, their authority was almost never challenged.



Technology

To break through the layer of hard permafrost, miners had to thaw the earth by either laying fires or pumping steam into the ground. More advanced mining equipment was slow to arrive in Dawson City, but by the peak of the rush water sluices, hydraulic devices and even a steam railway were in full use.



The Klondike Gold Rush saw millions of dollars dug out of the remote north-west Canadian earth, but also sparked the development of a new boomtown

In 1896 a small group of prospectors discovered gold in Rabbit Creek (later known as Bonanza Creek) in the Klondike region of north-west Canada. A few months later, the entire creek had been staked out by opportunist miners and prospectors in the hope of striking lucky. The following year they were joined by some 30,000 more travellers looking to find their fortune, or to profit from those who had already prospered.

Though in the mid-1890s it began as a small collection of shacks for a few hundred miners, Dawson City grew rapidly and by 1898 was home to over 30,000 residents. It was at the epicentre of the Klondike Gold Rush – perhaps the largest the world had ever seen, as well as one of the last of its kind. However, by 1899 all the lucrative creeks had been claimed and rumours of discoveries in Alaska led to 8,000 people leaving Dawson altogether.

During the three years of the rush 100,000 prospectors travelled to the remote region, only about a third actually arrived there and a lucky 4,000 actually found gold. In this time Dawson also shared the same meteoric rise and rapid fall of many of the Klondike miners. It was a period and a city that would remain ingrained in the culture of North America for many years to come.

Industry

Gold mining in the surrounding creeks – from individual prospectors panning in the streams to large-scale mining operations – was the foremost activity. The city also became home to blacksmiths, carpenters, builders and so on.

In the early days of the gold rush tools were pretty basic, mainly comprising picks and shovels

© Corbis Alamy

Heroes & Villains

Muhammad Ali

Controversial and outspoken but always entertaining, Ali fought not just his opponents in the boxing ring but the society he lived in

Written by Dave Roos

There he goes again. Every night, the same tall, serious boy running up and down the empty streets of racially segregated Louisville, Kentucky, wearing heavy steel-toed boots and jabbing at the thick summer air with intense concentration. His name is Cassius Clay, a quiet 15-year-old Baptist boy who attends Central High School. Day in, day out, all the kid thinks about is boxing. He trains by racing the city bus along its route. He doesn't drink alcohol or smoke, but religiously downs a training cocktail of milk and raw eggs.

> "I am the astronaut of boxing. Joe Louis and Dempsey were just jet pilots. I'm in a world of my own"

They say that he's going to be a champion one day. And to watch him train night after night, as he makes another lap down Greenwood Avenue to the Ohio River and back, sparring with invisible foes and smiling through the pouring sweat, you might just believe them.

Born to a humble sign painter and a housekeeper, Cassius Marcellus Clay Jr came to boxing through a lucky accident. When he was 12 years old, he rode his shiny new bike to a local street fair. While young Clay enjoyed the free balloons and ice cream, his bike was stolen. In tears, he sought out a police officer to report the crime. The officer on duty was Joe Martin, who happened to run the local boxing gym. When 40-kilogram (89-pound) Clay vowed to 'whup' the bike thief, Martin replied, "Well, you better learn how to fight before you start challenging people who you're gonna whup."

> "I'm not the greatest. I'm the double greatest. Not only do I knock 'em out, I pick the round"

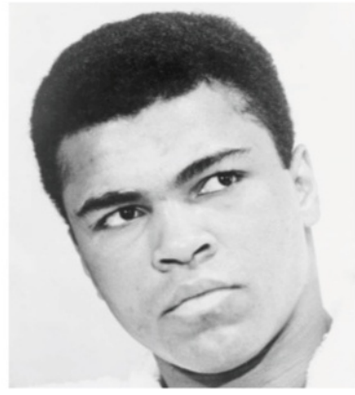
For the next six years, Clay all but lived at Martin's Columbia Gym. Martin said he was "easily the hardest worker of any kid I taught". Clay grew to a muscle-bound 1.9 metres (six foot, three inches) and grew even more in confidence.

Winning fight after fight, he worked his way up the amateur ranks to win the national Golden Gloves Tournament of Champions as a heavyweight in 1960 aged 18. It was under Martin's tutelage that Clay developed his phenomenal leg strength and trademark 'floating' footwork that dazzled and exhausted opponents.

The young champ won a spot representing the United States in the 1960 Olympics that were held in Rome, Italy, but almost didn't make the trip. Deathly afraid of flying, Clay only boarded the plane after buying a parachute at an army surplus store and strapping it to his back. In a glimpse of his future greatness, Clay clobbered his Polish opponent in the three-round gold medal match in the light-heavyweight division. No longer the shy kid from Louisville, Clay won the nickname 'The Mayor of Olympic Village' for his magnetic personality.

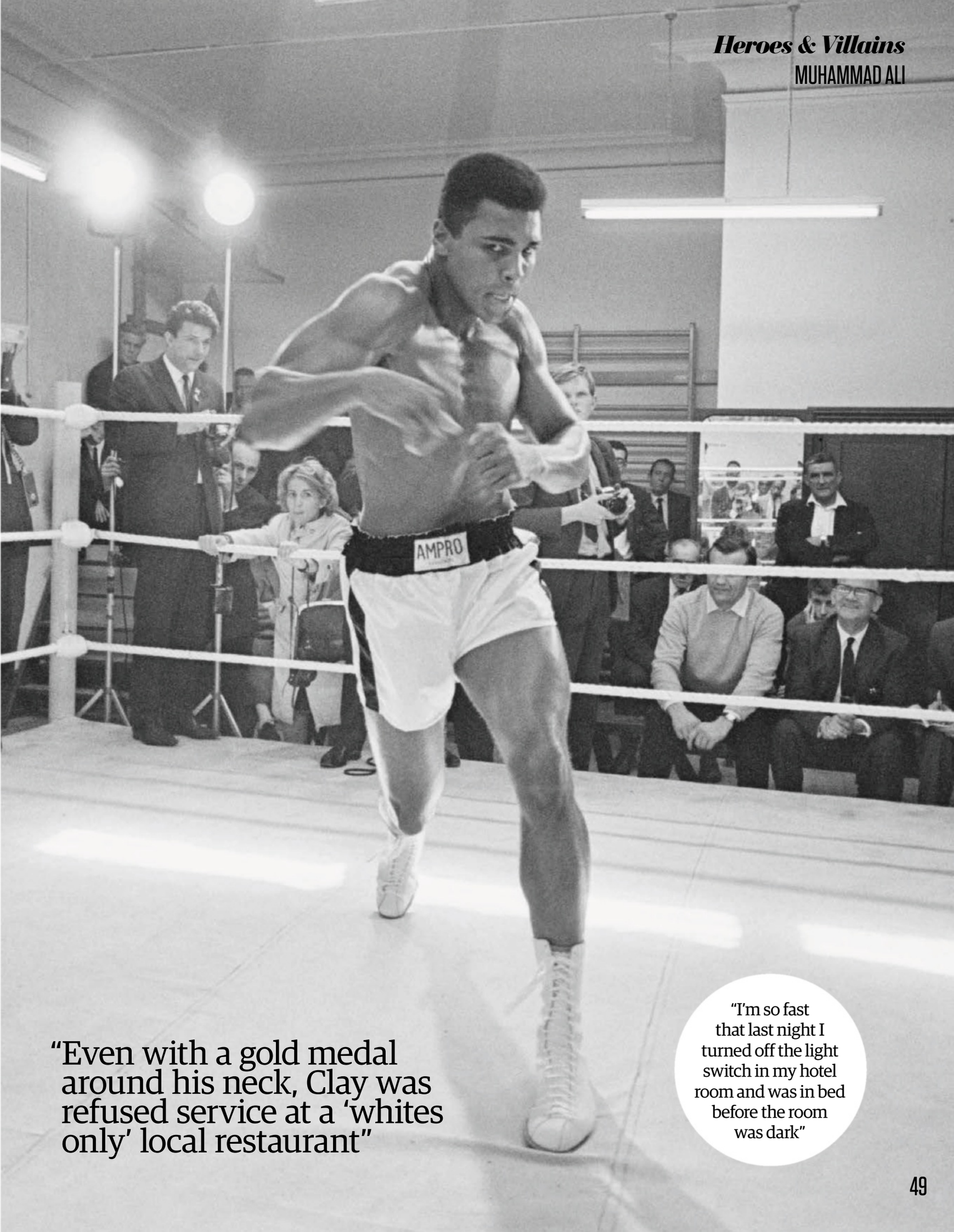
Clay returned to America an Olympic champion, riding in parades in New York City and receiving a hero's welcome at his former high school in Louisville. But some things hadn't changed. Even with a gold medal hanging around his neck, Clay was refused service at a 'whites only' local restaurant.

In late-1960, Clay signed his first professional contract, buying his mother a pink Cadillac with part of his $10,000 signing bonus. He also took on a new trainer in Miami Beach, Florida, and crushed his first six professional opponents - three by knockout. At his seventh fight in Las Vegas, Nevada, Clay met the professional wrestler 'Gorgeous George' Wagner. When someone jokingly suggested a brawl, George shouted, "I'll kill him! I'll



Clay to Ali

"Cassius Clay is a slave name. I didn't choose it and I don't want it," the 22-year-old champ said in 1964, days after his shocking defeat of Sonny Liston. "I am Muhammad Ali, a free name – it means beloved of God – and I insist people use it when people speak to me and of me." In many ways, Muhammad Ali's decision to join the Nation of Islam (NOI) and change his name was a direct result of his upset victory against Liston. Before the fight, the Prophet Elijah Muhammad had publicly decried boxing as a violent sport against the teachings of Islam, even though Malcolm X – the NOI's spokesman – had been grooming the brash young fighter to join the controversial cause of black militancy. But after Ali's underdog victory, the prophet embraced the outspoken champion, seeing him as a celebrity figure who could bring more black youth into the fold. Malcolm X – who never received an Arabic name like Ali – was expelled from the NOI soon after Ali joined the organisation, and Ali was forced to reject his friend and mentor. Decades later, Ali lamented, "Turning my back on Malcolm was one of the mistakes that I regret most in my life." Malcolm X was assassinated four days shy of the one-year anniversary of Ali's victory over Liston.



"Even with a gold medal around his neck, Clay was refused service at a 'whites only' local restaurant"

"I'm so fast that last night I turned off the light switch in my hotel room and was in bed before the room was dark"

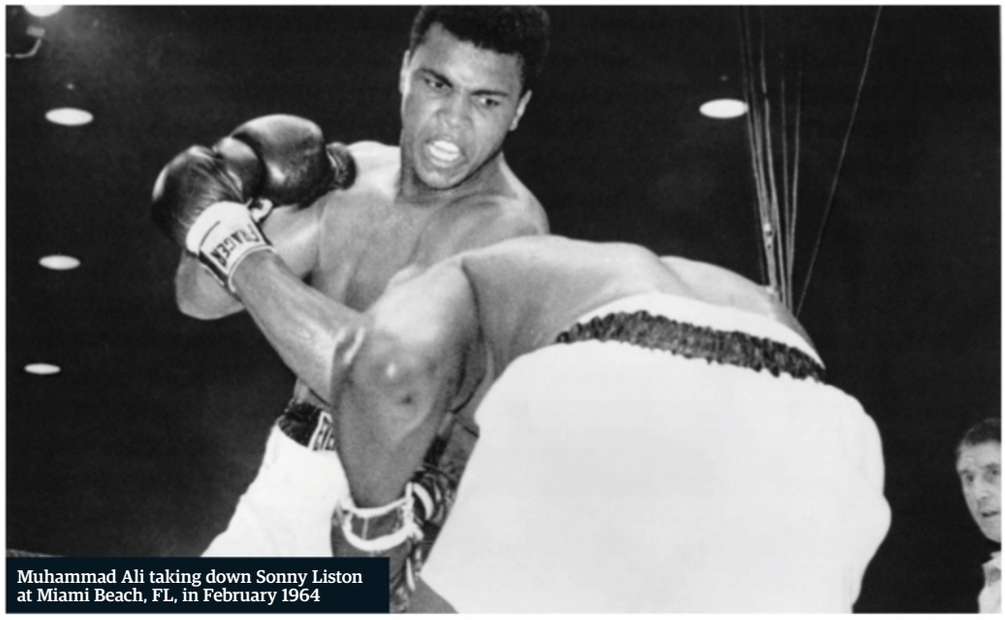
tear his arms off! I'm the greatest wrestler in the world!" Impressed by Gorgeous George's audacious self-promotion, Clay vowed he too would talk his own way to fame and fortune.

In February 1964, Clay was a trash-talking, undefeated 22-year-old known as 'The Louisville Lip' when he first earned a shot at the heavyweight title against Sonny Liston in Miami Beach, FL. Despite being a seven-to-one underdog, Clay "shook up the world" (his words) by defeating the ageing champ in a unanimous decision.

But what really shook up the sporting world wasn't the upset victory, but Clay's announcement the very next day that he had joined the controversial Nation of Islam (NOI) and changed his name to Cassius X – a refutation of his 'slave name'. As far back as high school, Clay had shown an interest in the notorious Black Muslim Movement, but it was through his friendship with Malcolm X – the influential civil rights figure – that Clay became politically active. Soon after Clay announced his membership in the NOI, the Prophet Elijah Muhammad renamed the heavyweight champ Muhammad Ali.

The public backlash against the name change was surprisingly intense. What the world saw was a self-styled loudmouth who unabashedly called himself the greatest on the planet, then joined a religious sect fuelled by racial outrage, and changed his name to the foreign and 'threatening' Muhammad Ali. Most journalists in the sports press refused to write Muhammad Ali in print.

Despite the controversy, Ali met Liston for a rematch in 1965. Greeted with boos from the crowd in tiny Lewiston, ME, Ali would punctuate his previous decision with a jaw-rattling knockout punch that dropped Liston to the canvas just two minutes into the first round. The black-and-white photo of Ali standing triumphant above the felled Liston – Ali still daring Liston to get back up – is one of the most iconic sports images of all time.


Muhammad Ali taking down Sonny Liston at Miami Beach, FL, in February 1964

With this decisive victory, Ali retained his title as heavyweight champion of the world – a title he would defend eight times over the next three years. But his victories in the ring were often overshadowed by his losing battle with the United States Army. Ali was drafted in 1964 with an understanding that he would serve as an entertainer and spokesperson, rather than an infantry fighter. However Ali refused to enlist. In 1966, Ali claimed 'conscientious objector' status, arguing that his religious beliefs prohibited him from serving in Vietnam or any other 'Christian' war, stating he had nothing against the Viet Cong. In 1967, Ali attended his army induction ceremony, but refused to step forward after his name was called. Ali was one of the first public figures to oppose the Vietnam War, but his refusal to enlist was a felony under US law, punishable by a $10,000 fine and possible jail time. Ali appealed his case to the local draft board, but was immediately stripped of his heavyweight title and his boxing licence. The draft board rejected Ali's appeal for conscientious objector status, but Ali's lawyers took the case all the way to the US Supreme Court, where Ali was finally vindicated by a unanimous decision to reverse the draft board's ruling.

"I wrestled with an alligator, I done tussled with a whale; handcuffed lightning; only last week, I murdered a rock"

The Supreme Court ruling came in 1971, a full three and a half years after Ali had been stripped of his title. The champion was robbed of some of



Defining moment

Cassius Clay renamed
March 1964

Clay has his first contact with the Nation of Islam in Miami, where a local leader named Cap'n Sam introduces Clay to Malcolm X – already a controversial household name in Sixties America. Clay is eager to join the NOI, but the Prophet Elijah Muhammad bans boxers. After Clay's high-profile victory over Liston though, he is welcomed into the fold. In a press conference a day after the fight, Clay announces his membership in the NOI and debuts his new name, Cassius X. Most of the American public, including Clay's own father, are furious. A week later, the prophet declares that Cassius X is ready for his true Arabic name: Muhammad Ali.

Timeline

1954

- **First win** At 12 years old, Clay trains with Joe Martin, and earns $4 for his first amateur fight – and first win: a three-round split decision with another kid named Ronnie O'Keefe. **October 1954**
- **National champ** Still in high school, Clay takes two prestigious national titles: the Golden Gloves Tournament of Champions and the national Amateur Athletic Union (AAU) light-heavyweight title. **1959**
- **Olympic gold** At only 18 years old, Clay achieves the greatest prize in amateur sport after beating Poland's Zbigniew Pietrzkowski for the Olympic light-heavyweight gold. **5 September 1960**
- **Going pro** Clay signs a contract with the Louisville Sponsoring Group (LSG), a group of white businessmen. He then moves to Florida to begin training with Angelo Dundee. **October 1960**
- **World champion** Clay, the undisputed underdog, defeats the ageing champion Sonny Liston in a seventh-round TKO to become world heavyweight champion at just 22 years old. **25 February 1964**
- **Ali vs Liston II** Ali schedules a rematch with Liston in November 1964, but three days before the fight Ali is hospitalised with a hernia. The fight is supposed to be in a large venue in Boston, but the deal falls through while Ali recovers. Scrambling for a new venue in May 1965, the promoters settle on St Dominic's Arena in Lewiston, ME. It will host one of the most memorable fights of Ali's career. **25 May 1965**

his best fighting years, and he returned to the ring with a massive chip on his shoulder. On 8 March 1971, Ali challenged Joe Frazier, a bruising fighter who Ali would battle three times over the next four years. This first bout, dubbed the 'Fight of the Century', would end in a 15th-round knockout of Ali – one of only five career losses.

"Joe Frazier is so ugly that when he cries, the tears turn around and go down the back of his head"

Over the next two years, Ali would return to defeat Frazier – a favourite target of the champ's poetic insults in the press – and finally take on the much younger, seemingly invincible George Foreman in 1974's infamous 'Rumble in the Jungle' in Kinshasa, Zaire (now the Democratic Republic of the Congo). Ali arrived in Africa to the cheers of adoring throngs, who screamed, "Ali, boma ye!" ("Ali, kill him!") wherever he went.

From the beginning, Muhammad Ali knew he didn't have the strength to equal the young muscle of Foreman, the reigning champ, so he devised a strategy to tire him out. Dubbed the 'rope-a-dope' tactic, Ali spent much of the first seven rounds against the ropes, protecting his face and letting Foreman pound away furiously at his body. Then, in the eighth round, Ali straightened up, dodged a lunging jab from the exhausted Foreman and unleashed with a lightning-fast combination of punches, the final shot square on the champ's surprised jaw, dropping him to the mat for a knockout.

In 1975, Ali and his showman manager, Don King, scheduled another overseas fight: the third and final match-up with 'Smokin' Joe Frazier called the 'Thrilla in Manila'. Both past their prime, the champs pounded each other mercilessly for 14 rounds in the oppressive heat. The brutal beating opened a gash under Frazier's eye and the ring doctor called the fight for Ali. Ali would complete another legendary three-match series with Ken Norton, eventually winning back the world heavyweight title for an unprecedented third time against the young Leon Spinks in 1978.

By the time Ali retired from boxing in 1981, he was known as much for his lightning rod personality outside of the ring as his record-breaking exploits in the ring. He was more than a sports hero; he was an outspoken civil rights leader, deified global celebrity, a man who stood up for his beliefs – even when it cost him the sport that he loved and the title he suffered so much to earn. In 1999, both *Sports Illustrated* and the BBC named Ali the sportsman of the century. Despite being hobbled by Parkinson's disease, Ali remains an activist and philanthropist to this day.

"Ali was one of the first public figures to oppose the war, but his refusal to enlist was a felony under US law"

Defining moment

Rumble in the Jungle
30 October 1974

After a three-year exile from the sport, Ali challenges heavyweight champion George Foreman for the title. Foreman is an undefeated 25-year-old mountain of muscle who had knocked out two of Ali's former rivals: Joe Frazier and Ken Norton. Don King, Ali's manager, collects millions from the government of Zaire to stage the fight in the African nation (now the Democratic Republic of the Congo). The fight is postponed for a month due to a cut over Foreman's eye. Ali takes the opportunity to tour the country, building up a supportive fan base. Using his infamous 'rope-a-dope' technique, Ali wears down the hard-hitting champ before landing a knockout punch in the eighth round to reclaim the title.





Martin Luther King Jr delivers a speech at St Paul Campus at the University of Minnesota

Life in the time of Clay/Ali

Breaking the colour barrier
When Ali was five years old, Jackie Robinson became the first black athlete to play on a professional American sports team. In the boxing world, however, black people had been fighting professionally for decades. Jack Johnson was the first black man to win the heavyweight title back in 1908.

The end of segregation
Ali discovered his passion for boxing in the same year as the historic Brown v Board of Education of Topeka decision that desegregated all public schools in America. Before Brown, no black undergraduate students were admitted to the University of Kentucky in Ali's home state.

In the crosshairs of hate
During the height of Ali's career in the 1960s, the world lost President John F Kennedy, Martin Luther King Jr and Malcolm X to assassins' bullets. Ali himself received numerous death threats after he refused to fight in Vietnam and joined the Nation of Islam.

Rap pioneer
In the early-Sixties, new musical forms like ska and reggae were emerging in Jamaica, including 'toasting' by DJs – a precursor to rap. In 1963, Ali released an album called *I Am The Greatest*, which included original spoken-word poems that could qualify as early rap.

Integration vs separation
When Ali joined the Nation of Islam (NOI) in 1964, he took a controversial side in the heated battle over race in America. Martin Luther King Jr and followers promoted civil disobedience and racial integration. Ali and the NOI, on the other hand, believed that racial harmony could only come through separation.

The draft
Ali further incenses public opinion by refusing to enter the US Army to serve in the Vietnam War. He claims conscientious objector status as a Muslim minister.
1966

Exile
The US Department of Justice convicts Ali of draft dodging and revokes his passport. He is also stripped of his heavyweight title and boxing licence, banning him from the sport.
27 June 1967

Vindication
After several rounds of appeals, the Supreme Court of the United States reverses Ali's conviction, saying the draft board gave no valid reason to deny conscientious objector status.
28 June 1971

Thrilla in Manila
In their third and final epic battle, Ali defeats Joe Frazier after 14 punishing rounds. The rivalry with Frazier is among the greatest in modern sport.
1 October 1975

1984



Parkinson's
Three years after retiring from boxing (for the second time), Ali goes public with his diagnosis of Parkinson's disease. Despite the thousands of blows Ali took to the head during his boxing career, physicians debate the connection between head trauma and Parkinson's, which is a genetic neurological condition.
1984

©Getty/Alamy

Napoleon vs

The epic story of two warriors and their personal battle that would decide the fate of empires

Written by Chris Fenton

As the smoke from cannon and musket fire over the fields of Waterloo lifted, the fate of Europe had been decided. Arthur Wellesley, Duke of Wellington, had defeated his nemesis, Napoleon Bonaparte – who had single-handedly plunged Europe into war.

Sitting on his horse, looking out as the Sun was setting on a landscape of the dead, dying and wounded, Wellington felt neither triumph nor joy. Rather, a sense of disappointment surrounded the leader who'd overseen the destruction of Napoleon's war machine. In grim reflection the general declared, "Damn the fellow, he is a mere pounder after all!" Napoleon's reputation had preceeded him and it was found wanting. Everything Wellington had heard about Napoleon – his tactical genius, his skill in manoeuvring, his ability to read the battlefield – had all turned out to be false. He was merely a pounder, one who just threw more and more men onto British guns to be shot down. Their rivalry had killed thousands, their personalities had fascinated and repulsed

NAPOLEON BONAPARTE

French, 1769-1821

Brief Bio

Born on Corsica, Napoleon's family was given a scholarship for his education and military training in France gaining a commission in the army. He then served in the Republican army and led a military coup, overthrowing the directorate and declaring himself emperor of France. After Waterloo he was exiled to the mid-Atlantic island of St Helena where he died six years later.

Wellington

each other in equal measure. But which of these great military commanders would really best the other in terms of legacy?

Oddly enough the two had never met in battle before Waterloo, but their lives had transcended through coincidence and circumstance in the years leading up to 1815. Both men were born in the same year and would be seen as outcasts by their countrymen, Wellington growing up in Ireland, Napoleon in Corsica – far from the cosmopolitan power hubs of Britain and France, respectively.

Wellington was luckier however; his family was rich and had connections. He could afford to be sent to private school and to buy himself a commission in the army. He continued up the ranks by buying authority, an approach viewed favourably by his family who often regarded him as a 'dreamy, idle and shy lad' – a far cry from the warrior that history remembers.

Napoleon, on the other hand, could not afford such a prestigious position so quickly. His family was awarded enough money for him to attend a school in Autun, France, and then a military academy where his first command was an artillery detachment; it was a stark contrast to the glamorous assignments in India Wellington enjoyed.

This was the classic story of the noble gaining rewards through connections, while the impoverished bourgeoisie struggled, through hard work, to gain recognition and it would dominate the two men's ideologies in later life. Wellington's formative years had made him reliant on the establishment and the noble network of patronage, while Napoleon was a child of enlightenment ideals, acquiring worth through hard graft and the need for recognition for all he had gained. Both men were ambitious but this ambition was funnelled through different class backgrounds: one emphasising establishment, the other a new and changing world view.

Revolution, radical upheaval and the guillotine would force them to pick sides in the wars

"Both men were born in the same year and would be seen as outcasts by their countrymen"

ARTHUR WELLESLEY, FIRST DUKE OF WELLINGTON

British, 1769-1852

Brief Bio

Born in Dublin, Ireland, in 1769, Wellington was educated in Eton and quickly joined the army where he led a distinguished career in India. He returned to Europe to fight the armies of Napoleon, finally defeating him at the Battle of Waterloo. He went on to pursue a political career, becoming prime minister in 1828. Retiring in 1846, he died six years later.

that were spreading like wildfire across Europe. Napoleon witnessed the French mob overrunning the royal family's palace at Tuileries, murdering the Swiss Guards as they surrendered. As the mob tore the palace apart, he marvelled at the power of the French people at their most motivated; he would make sure that the soldiers in his armies never lost this idealistic enthusiasm. To Napoleon the French Revolution was the hope for 'right thinkers' and the 'centuries of feudal barbarism and political slavery' would end in France as the light of liberty swept through the nation.

Wellington took an opposing view, noting in his diary: 'the Revolution, as it is called... has rather augmented the evil by bringing forward into public employment of importance, more inexperienced people... entirely incompatible with the nature of their business'. To him, the French Revolution and the terror that followed represented what would happen in Britain if society did not keep the man on the street in check. These views would harden as France rejected monarchical power for ever, Napoleon embracing the new regime as the next step in civilisation, while Wellington speculated that it would destroy civilised society.

"His ambition and fiery personality shattered countries and brought forth a new order"



Young Napoleon and his rise to fame at the Battle of Aboukir, 1799

The radical ideals instilled in Napoleon in his early life came to the fore during the years of military campaign. He grew tired of the corrupt nature of the French directorate which took over from the monarchy, declaring himself consul and then emperor in 1804. His ambition and fiery personality shattered countries and brought forth a new order – *his* order. The men serving under him loved his grandstanding and followed 'him cheerfully barefooted, and without provisions. Such was the enthusiasm, or rather the fanaticism, which Napoleon could inspire among his troops', as memoirs from his German campaigns recorded.

Wellington fought him by proxy, through his armies in Spain and, reflecting his desire for established order, drilled and flogged his ragtag army of demoralised British, Portuguese and Spanish troops turning them into a force that could win battles. It was two very different command styles and publicly the leaders would sneer and berate each other.

Napoleon would bite at Wellington's early career in India claiming that he was nothing more than a 'sepoy general', good at looking grand in exotic palaces but not at much else. While his adversary would lambaste Napoleon as a dictator claiming that everything he did carried an element of meanness. He ridiculed Napoleon's power claiming that 'Napoleon's power stands upon corruption, that he has no [admirers] in France but the principal officers of his army'.

In private and to select friends, however, these explosive attitudes were very different. After the Battle of Toulouse in 1814, Napoleon complimented the military talents of Wellington and the bravery of his troops to a select group of officers. For Wellington the emotions ran deeper still, acquiring a huge bust of Napoleon so he could look him in the eyes during his years in England. He commented, "I would at any time rather have heard that a reinforcement of 40,000 men had joined the French army, than that he had arrived to take command." This mix of emotions betrays a fascination that both men held for each other – the radical differences in political and ideological beliefs attracting both to comment on one another's actions, even to the point where Wellington felt he needed to be around his opponent at all times, making space in his home for his rival – albeit a plaster likeness.

Love and romantic intrigue was never far away from dashing military officers commanding the armies of empires. The personal lives of both the generals presented a mixture of triumphs and defeats as dramatic as any of

HEAD TO HEAD Politics



Wellington

Policies ★★★☆☆
Staying power ★★★★☆
Legacy ★★★☆☆
Overall ★★★☆☆

In his twilight years, Napoleon said that his Napoleonic Code – a codified set of laws protecting civil liberties and property rights – was his greatest achievement since his battles would be forgotten after Waterloo. Indeed, it changed France for ever and they still exist today in the French legal system as well as several other legal systems around Europe – his reformist ideals and vision for a new society outlasting him. The passion to reform that drove Napoleon was not present in Wellington. As a loyal part of the British establishment he clung to the British political structure with what he described as 'unhesitating zeal and cheerfulness'. He reacted against a number of liberal reforms including the Catholic Relief Act, which was designed to give Catholics more political representation in England. He also opposed the parliamentary Reform Act during his first tenure as prime minister (1828-1830) – an act that would have given greater democratic weight to the House of Commons. His uncompromising view that conservatism was the only way to prevent the guillotine appearing in Piccadilly and the threat from the common people whom he saw as 'rotten to the core' would eventually call an end to his political career when a new era of liberalism overtook British politics and society in general.

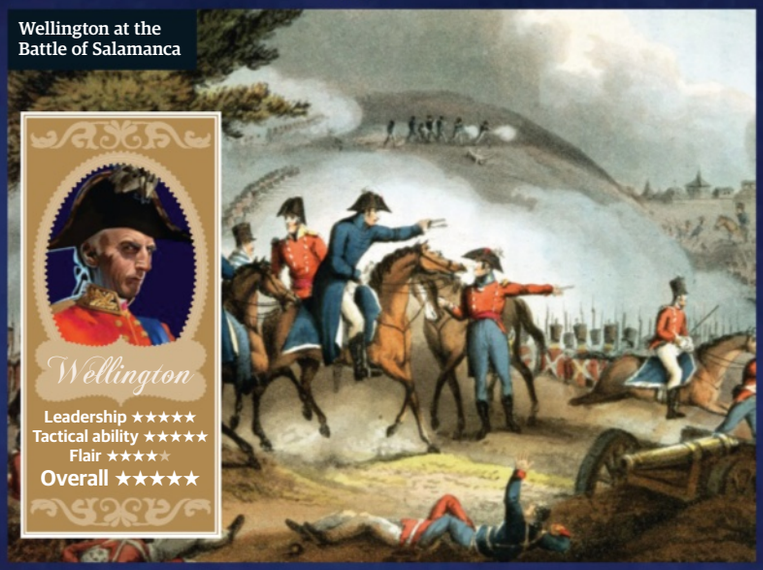


Napoleon

Policies ★★★★★
Staying power ★★★★☆
Legacy ★★★★☆
Overall ★★★★☆

GREATEST MILITARY MASTERPIECE

Battle of Salamanca



Wellington at the Battle of Salamanca

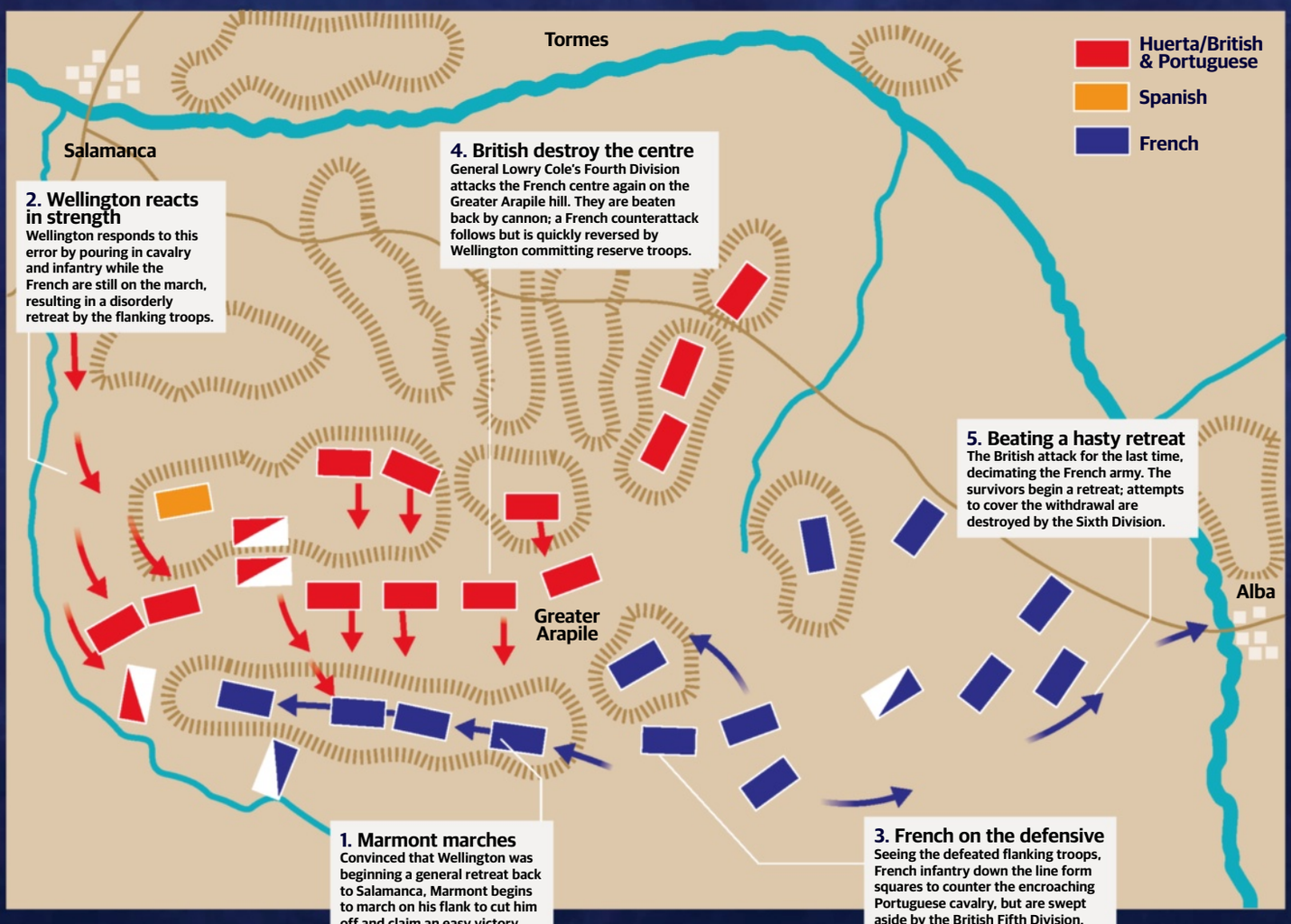
Wellington

Leadership ★★★★★
Tactical ability ★★★★★
Flair ★★★★☆
Overall ★★★★★

The Battle of Salamanca was fought in the fog of war, the endless cannon and musket fire patching the air with thick black smoke. It was a battle that exemplified Wellington's ability in the attack and put to rest the rumours that he was the master of the defensive battle only.

By 1812 Wellington had crossed over the Portuguese border capturing the Spanish town of Salamanca. A French army under Marshal Auguste-Frédéric de Marmont was waiting. Wary of the French numbers, Wellington waited for them to make the first move. In a critical miscalculation, Marmont mistook the British baggage train moving back as a general retreat. Too eager to claim Salamanca for his emperor, he shifted his forces to swing round to the west in an attempt to cut off the British before they fell back.

Wellington seized his opportunity, ordering a huge assault on the head of the flanking French forces, while they were still marching into position. The French were stunned, hundreds cut down from sabre wounds or shot. At the same time the French divisions facing Wellington in the centre had become dangerously weak because of the shift west. Wellington ordered another assault on their positions, causing the French to pull back with cavalry crashing down on the survivors. Panic swept across the French line, while divisions on the right held on; the French command – including Marmont himself – had been wounded in the attack. Confusion reigned until a French counterattack was beaten back forcing the French to retreat. It was a battle that more than proved Wellington's martial abilities.



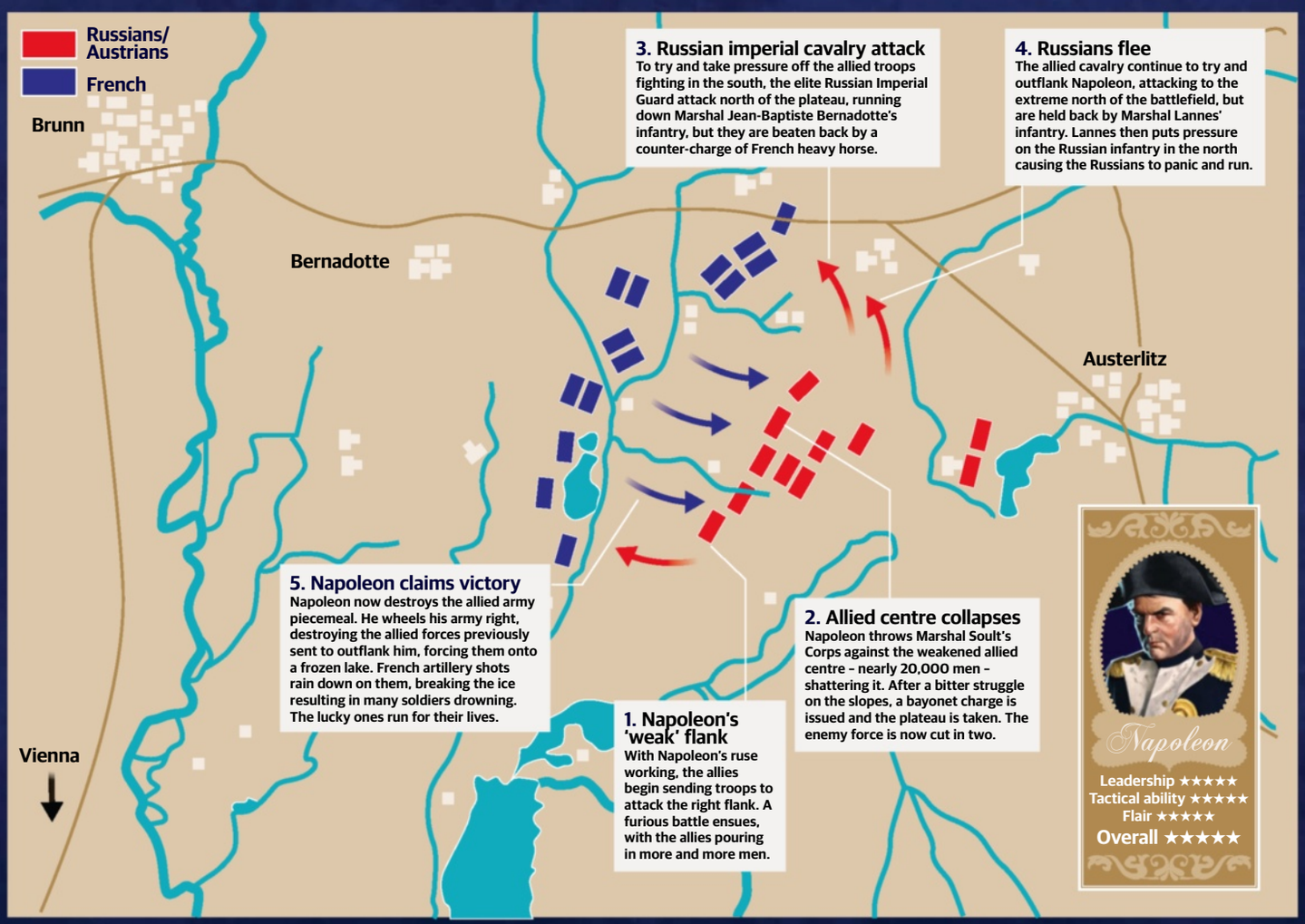
GREATEST MILITARY MASTERPIECE

Battle of Austerlitz

The Battle of Austerlitz was a masterclass in deception and manoeuvre. In the winter of 1805 Napoleon's Grande Armée faced off against the combined might of the emperor of Russia, Alexander I, and General Karl Mack, Baron von Leiberich of Austria. The three armies met near Austerlitz for a showdown in arms. The Russian and Austrian allies occupied the Pratzen Plateau to act as their central position and, after receiving intelligence that Napoleon's flank was weak, they struck south, towards the French right to cut them off from Vienna. This attack was repulsed by a French force in strength – something the allies were not expecting. As the allies threw in more men to reinforce the southern attack, the allied position on the plateau started to weaken from the drain in manpower. Napoleon was overjoyed; it was all going according to plan. By making the enemy command think his flank was weak, the allies were funnelling troops away from the strategically vital plateau leaving it open to attack. The ensuing French assault was so ferocious that it sent the allies into a panic, shattering their line and cutting the allied army in half. Repeated attacks north of the plateau could not push the French away from the central position, leaving Napoleon to clean up. In blind panic, allied soldiers originally sent to flank Napoleon ran over the frozen ponds south of their positions as French artillery fire broke the ice. Many of the wounded were trampled and drowned in the icy waters. It was a masterstroke of deception, Napoleon essentially using his own flank as bait to draw his opponents to their deaths.



Napoleon at the Battle of Austerlitz



their exploits on the battlefield; their love life also had a lasting influence on them personally.

Wellington married out of duty to a woman he had previously confessed his love to, Catherine Pakenham, in 1806. Wellington found his wife's depressive nature and her inability to keep track of her spending extremely frustrating. Given his tight-lipped nature, he quickly became estranged from her and, as rumour would have it, took a mistress – Harriet Arbuthnot. Arbuthnot later commented on a portrait of Wellington in civilian clothes describing it as something others rarely saw – a 'softness and sweetness of countenance'. If Wellington was in love though, he rarely let his passions show, especially in public.

As the polar opposite to this hard outward exterior, Napoleon – now in post-revolutionary France – married his sweetheart, Joséphine de Beauharnais. Napoleon loved his new wife fiercely; it was said that few women possessed more charm and his love letters were famously graphic for the time. In one passionate exchange he pledged to give her a thousand kisses, but he tells Joséphine to 'give me none, for they fire my blood'.

A commentator speculated that one of the main factors that drove his aggressive nature in battle was to impress her through his military skill. This love was not to last, however. In a painful exchange of letters to his brother sent when he was on campaign in Egypt, he discovered that Joséphine was being unfaithful. When he heard the news he convulsed and banged his fists against his head, leading him to become despondent about life and the people around him. He divorced in 1810, after a string of mistresses that were designed to exact revenge on Joséphine's betrayal. The lovesick Napoleon found little consolation in his second wife, Marie-Louise Archduchess of Austria, who he would describe as 'a walking womb' for political advancement.

Both men were unlucky in love, but there is a critical difference: Napoleon's personal life almost destroyed his ambition and shook him to his very core, whereas Wellington kept his emotions in check, befitting his very English upbringing.

Military defeats, political setbacks and the invasion of France by Britain and its allies forced Napoleon to abdicate his throne and be exiled to Elba, a small island in the Mediterranean. A few days before he left for Elba, he wrote a letter to the woman he had never stopped loving, Joséphine: 'Never forget him who never forgot, and who never will forget you'.

This was a man who was reflecting on his defeats and heartbreak. As a final humiliation he was allowed to keep the title of emperor – emperor of a tiny Mediterranean island with a population numbering no more than 12,000. Joséphine never visited him on Elba; she would die in 1814 while Napoleon was in exile, compounding his woe. He

HEAD TO HEAD Leadership



Wellington

Military ★★★★★
Popularity ★★★½☆
Charisma ★★★★½
Overall ★★★★½

It goes without saying that both Napoleon and Wellington had considerable command ability and the military skill of these men changed the course of history, but their approach differed considerably. Wellington was renowned for his reliance on strict discipline – something which he saw as the key to victory. He once commented in 1813 that his troops were the 'scum of the Earth', unmotivated and little more than criminals which he would train and drill, turning them into heroes. To the average British soldier he was a terrifying figure and life within his army was a harsh routine of endless drills, training and floggings. While Wellington may have gained prestige as a great general in the palaces of government, his men would not thank him for their experiences. By contrast to this iron discipline, Napoleon preferred to grandiose himself in front of his troops to inspire them to great deeds of courage. The French soldier – already stirred by the great events of the French Revolution – would cheer and chant "Vive l'Empereur!" during army reviews – the passionate, hot-blooded nature of Napoleon standing in contrast to the cold, conservative nature of Wellington's stiff upper lip. Napoleon would capitalise on this enthusiasm through many a conquest with his adoring and loyal troops.



Napoleon

Military ★★★★½
Popularity ★★★★★
Charisma ★★★★★
Overall ★★★★★



Napoleon was not only fighting the British at Waterloo, but the Seventh Coalition which comprised Dutch, Belgian, Prussian and German troops too

HEAD TO HEAD Legacy



Wellington

Military ★★★★★
Political ★★☆☆☆
Fame ★★★☆☆
Overall ★★★☆☆

Wellington's cold ambition, his unemotional nature and his unflinching resolve are what we often remember, hence his alias: the Iron Duke. He was the great military hero who stoically defied the tyrannical ambitions of the 'evil' Napoleon and, through British ingenuity, checked the Grande Armée by beating it at its own game. What is forgotten is the sacrifice of British troops, the great reverses in fortune and the unrelenting conservatism which undid his political career. For Napoleon it is often seen the other way round. His defeats are remembered, the tragic story of his exile to St Helena is emphasised, and his invasions of countless countries are condemned as warmongering. One could argue that, since he lost everything in a spectacular final gamble at Waterloo, it is Wellington who ultimately wins the battle of legacy. But a closer look at the political scene post-Waterloo tells a different story. Napoleon's victories in countries like Spain, Prussia and the Italian states brought with them enlightenment ideals of a codified system of law guaranteeing the rights of the citizen as well as democratic principles – albeit under French domination – to countries that previously existed under the yoke of dictatorial monarchies. These laws would live on, and so would Napoleon.



Napoleon

Military ★★★★☆
Political ★★★★★
Fame ★★★★★
Overall ★★★★★

"Napoleon decided to roll the dice one last time in an attempt to take ultimate power"

kept himself busy ushering in a number of reforms on the island for the benefit of its populace, but often he launched into vicious tirades and depressive rants, saying that his generals had betrayed him, that he had trusted the wrong people, that he had lost everything.

By contrast, Wellington was triumphant. He travelled to Paris having been made a duke and, in a show of power, was appointed the British ambassador to France. He took in the delights of Paris – now an exciting, free city, met his mistress in romantic Parisian suburbs and was lauded as a true British hero at home. He continued to write his memoirs, but grew tired of journalists and authors, especially when rumours circulated about his private life.



Napoleon exhausted after Wellington defeated him in Spain

It was the confidence that Wellington gained after 1814 and the depressive self-reflection that Napoleon went through on Elba that would dictate the epic battle that would leave one of them standing victorious a year later.

After sensing that the restored royal power in France was weakening, Napoleon decided to roll the dice one last time in an attempt to take ultimate power. In a daring escape he slipped away from his guards and, with help from his loyal followers, sailed to the French mainland for a final reckoning with Wellington. At Waterloo, the personalities, the war of words, the endless studying and critiquing of each other's abilities came to bear in the heat of battle.

Napoleon believed totally in his troops; his soldiers had conquered everything in the early years of that century and, in his eyes, this battle should have been no different. Yet at Waterloo his judgement was impaired; there was no signature masterstroke as seen at Austerlitz in 1805. The year in exile, the loss of his beloved Joséphine and the trauma of losing his empire had finally broken his ability to read the battlefield, causing the edifice of his military genius to crumble.

His physical health was also frail after the stresses of the last ten years; he was suffering from crippling stomach pain which prevented him from ordering his troops clearly. Instead of attacking straight away he dithered, initially afraid to lose his army which was the only thing giving him legitimacy. He then changed his mind, committing himself to head-on attacks into British muskets and cannon. Rather than being in control of his ambition he was blinded by it – his lust to win and regain his power overriding his skills in directing the battle.

Wellington described Waterloo as a 'pounding match', but Wellington was wrong. Napoleon was not merely a pounder; it was his personal defeats taking their toll. He was a desperate man – desperate to silence his critics and become emperor again – no matter the cost.

Wellington took advantage of his adversary's unhinged emotional state. He had the confidence, having defeated the troops of Napoleon before, he had the charisma having gained glory and fame in England after liberating Portugal and Spain, and he had the hard-nosed will to win. In the end the Iron Duke's steady, iron temperament had outlasted the reckless, up-and-down personality of Napoleon.

Like a tragic character in a Greek epic, Napoleon had claimed his empire, had been defeated and now suffered indignity in enforced exile – this time for good. His ambition had ultimately bested him, losing to a man who had never overplayed his hand in his quest for power.

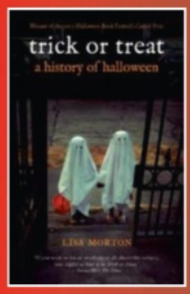
The former emperor's bitterness was chronicled in his memoirs which he wrote during his time on the Atlantic island of St Helena, claiming that Wellington's plan at Waterloo 'will not in the eyes of the historian reflect any credit on Lord Wellington as a general... [H]is plan did not show talent.' He did, however, praise the bravery and firmness of Wellington's troops.

On the surface, it would be easy for Wellington to claim the strongest legacy given the victories he achieved and dismiss Napoleon as nothing more than a sore loser. Yet Wellington's triumphs only gave to him what British society would allow him to gain. In the end his political career after Waterloo fell to pieces because the establishment – which he had given his lifeblood to protect – no longer tolerated him. Napoleon had created from scratch his own establishment in the form of his European empire which, at its height, stretched from Spain to the gates of Moscow. His lust for life and liberty, plus his passion for a better world that he would preside over, were his raison d'être.

He once said that the invasion of Russia would make him 'master of the world'. Not content to be handed what others were willing to give him, Napoleon wanted the world for himself. His power wasn't to last, but nevertheless his ambition presents a striking image of aspiration since through sheer force of will he fought to have it all.

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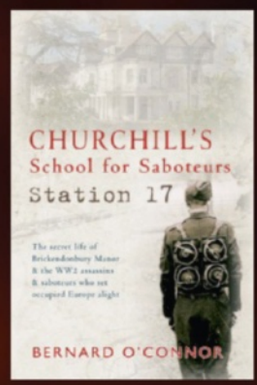
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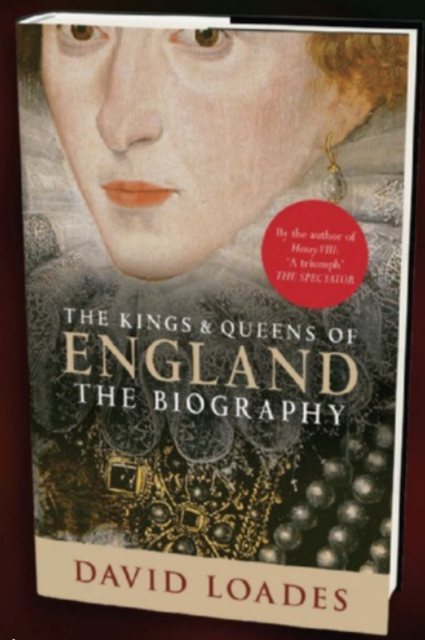


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★WANTED★

10 INFAMOUS OUTLAWS



From highway robbers to Wild West bandits and fearless freedom fighters, pass your own verdict on some of history's most audacious and enduring criminals

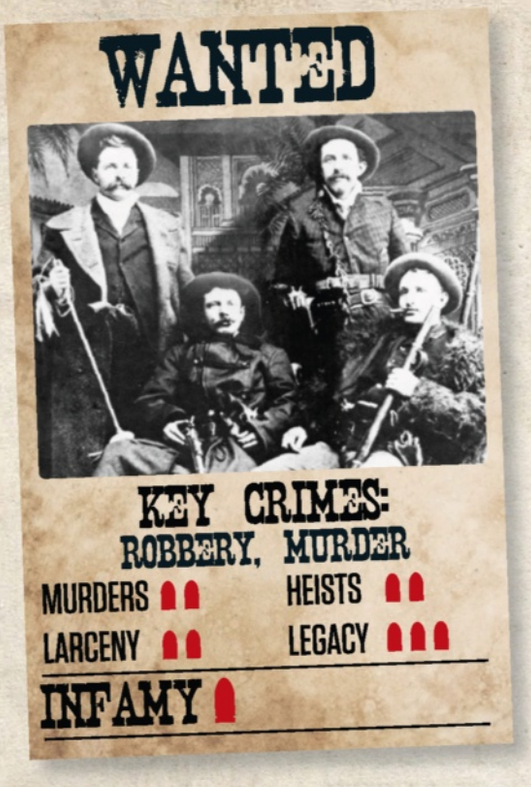
Written by Jonny O'Callaghan

Across history there are countless villains that have robbed and murdered their way to riches. Some of these are revered among their countrymen as legends, while others have been vilified.

History is littered with outlaws that have romanticised what it means to be a criminal. Many are quick to be labelled as that era or region's 'Robin Hood' (the famed outlaw from 13th-century English folklore), but in truth most of these men and women only had their own interests at heart.

From Roman England through to the 21st century we've picked out ten of the most notorious rogues that ever roamed free, with each performing devilish and memorable enough deeds to earn a place in this roundup of enduring outlaws.





★10★

JESSE JAMES 1847-1882

Born in Kearney, Missouri, to hemp farmers Robert and Zerelda James, the life of Jesse James and his brother Frank would change for ever when, in the summer of 1863, Union soldiers attacked the Confederate James' farm.

Angered by the brutality of the Union, Jesse and Frank turned to crime and, following the Confederacy's defeat in spring 1865, led their newly formed James Gang on a vendetta against any institution the North had laid its hands on. Banks, trains and more were all considered fair game to Jesse and his gangmates, often with gruesome outcomes for those involved beyond just theft. The notoriety of the James Gang spread far and wide in the Confederate states, with many declaring them heroes and even modern-day 'Robin Hoods'. In reality they kept most of their plunder for themselves, and were not adverse to resorting to murder to achieve their goals. Overall it's now thought that they were responsible for dozens of robberies and numerous murders, with their stolen money totalling in the thousands of dollars. On 3 April 1882, however, Jesse was betrayed by gang member Robert 'Bob' Ford who shot him in the back of the head to claim a sizable reward, thus bringing an end to Jesse James's short but illustrious career as an outlaw.

HEREWARD THE WAKE

★09★



The Saxon outlaw terrorised the Normans

CIRCA 1035-CIRCA 1072

Also known as Hereward the Outlaw, this notorious rogue from the Middle Ages has been written into many fictitious legends of times gone by, but his existence is all but a certainty.

A Saxon descended from Danes he was exiled by King Edward the Confessor to Europe aged 14. When William the Conqueror became king of England in 1066, Hereward returned. With the Normans having slain his brother and taken his family's land, Hereward wreaked vengeance upon the French and displayed the heads of his fallen enemies above his door.

After a failed attempt to take the throne in 1070, Hereward was forced to live as an outlaw in the forests of the Fens in eastern England. He was a constant thorn in King William's side, however, and ultimately the king agreed to give Hereward's land back in return for a truce in hostilities.



"Hereward displayed the heads of his fallen enemies above his door"

★08★
DICK TURPIN 1705-1739

This highway robber has gone down in history as one of the most notorious British legends, but Dick Turpin's crimes are often portrayed in a much more charming light than the grisly reality.

Born in Essex, England, in 1705, he began his working life as a butcher before falling into a gang. By 1735 he had become a highwayman, holding up stagecoaches and robbing the rich of their money and valuables. In 1737, however, he was recognised by servant Thomas Morris and things quickly escalated. After Turpin shot Morris dead, a Royal Proclamation was issued for his capture.

After changing his identity to a horse dealer by the name of John Palmer and moving to the village of Brough in East Yorkshire, Turpin was eventually arrested for shooting a cockerel and stealing horses.

However, his true identity came to light when his handwriting was recognised in a letter which he'd sent to his brother-in-law, and it wasn't long before he was found guilty of his former crimes and hanged on 7 April 1739. His misdeeds as a highwayman may leave some to remember him as a lovable rogue, but make no mistake, this robber had a dark side – and blood on his hands.



Scourge of English highways in the 18th century



★07★
BELLE STARR
1848-1889

Belle Starr was a renowned outlaw from the American 'Old West'. She was born near Carthage, Missouri, in 1848, receiving a classical education – learning how to play the piano, for instance. But from an early age she was involved with some of the country's most notorious criminals, including Jesse James, and her reputation as one of the few female outlaws would earn her the nickname 'The Bandit Queen'. She would ride her mare, Venus, stealing horses and cattle as she drifted through the fringes of the Wild West. She became involved in the Starr clan, an outlaw Cherokee family, after the death of her first husband in 1874. Here she was the front for the bootleggers among their clan, but was captured along with her second husband for rustling horses – serving nine months in prison as punishment. After a life of crime and a string of husbands who fell foul of the law, Belle Starr was shot in the back by an unknown assailant in 1889.



★06★ AL CAPONE

1899-1947

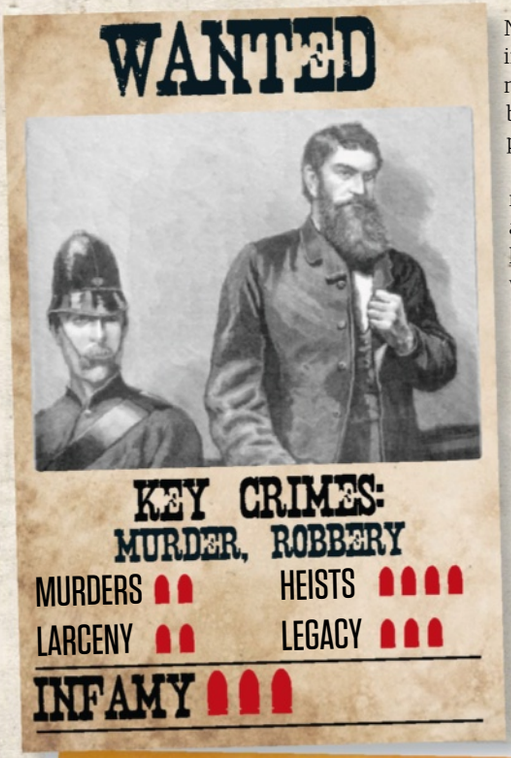
Born in Brooklyn, New York, on 17 January 1899, Alphonse 'Al' Capone would go on to become one of the most infamous American gangsters. His squalid beginnings, coupled with a timid and law-abiding family, hid what he would become.

At the age of ten Capone met gangster Johnny Torrio, who taught him how to run a racketeering business. Eight years later he was hired by the brutal gangster Frankie Yale as a bouncer and bartender, receiving his famous scar in an altercation on the job. In 1925, following the serious injury of Torrio in an assassination attempt, Capone was appointed head of the Chicago mafia. He ran the streets with his mob and had several high-ranking officials across the city on his payroll.

After a failed attempt at killing Bugs Moran – a member of a rival Chicago gang – in 1929, Capone was tracked down by Eddie O'Hare and the IRS and sentenced to 11 years in prison for tax evasion on 24 November 1914 (partly served at Alcatraz). After his release in 1939, he spent time in hospital before moving to his estate in Miami, FL, where he died of a stroke and pneumonia – but not before having his former lawyer O'Hare killed for his betrayal.

★05★ NED KELLY

1855-1880



Ned Kelly is one of the most infamous outlaws in Australian history. Born in Victoria he had numerous run-ins with the law as a youth. In fact, by the age of 19 he'd served over three years in prison, primarily for stealing a horse.

It was at 22 years old that the life of an outlaw really begun for Kelly. He was accused of shooting a police officer in the hand, forcing him to go into hiding with his brother Dan. The two teamed up with friends Joe Byrne and Steve Hart and, when Kelly's mother was arrested and sentenced to three years in prison, his hatred of the law only intensified. Kelly and his gang ambushed a police camp a few months later resulting in the deaths of three policemen, after which a bounty was placed on Kelly and his gang in November 1878. Despite this, the gang would go on to rob a number of banks in the ensuing months, becoming notorious across Australia.

Following a standoff with police at a hotel in 1880, Kelly – wearing his now famous cobbled-together plate armour and metal helmet – found himself alone after the death of the other members of his gang. He was sentenced to be hanged on 11 November 1880, aged just 25.



Ned Kelly, the terror of the Australian outback

★04★ BOUDICA

UNKNOWN-CIRCA 61 CE

In the face of brutality from the Roman Empire which conquered southern England in 43 CE, one female outlaw stood strong and led her Celtic tribe against their oppressors. Boudica was the wife of Prasutagus, the head of the Iceni tribe in east England, earning herself the name 'Queen of the Iceni'. Following the Roman invasion of Britain, two Celtic kings were allowed to continue to reign over their domains – one being Prasutagus. But following his death around 60 CE, the Romans laid claim to Iceni territory.

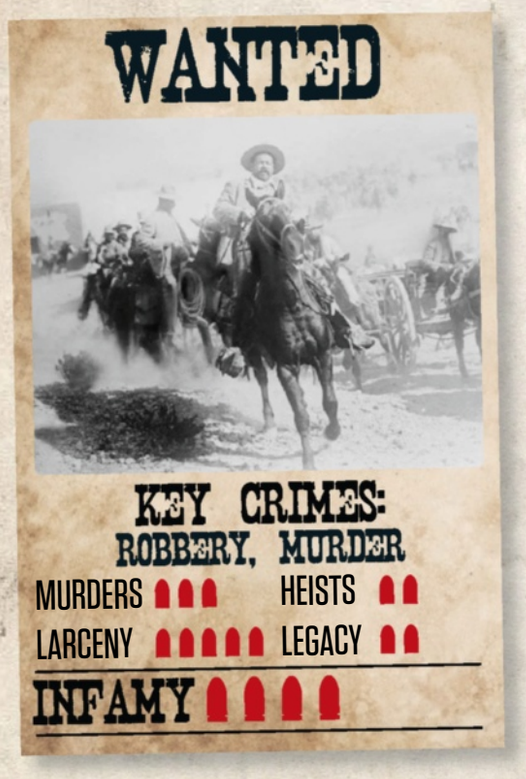
After numerous atrocities against her people, Boudica led an uprising against the Romans. She took 100,000 Iceni to the Roman capital in Camulodunum (now Colchester) and drove the invaders out, burning the city to the ground.

She marched on to destroy Londinium (now London) and Verulamium (now St Albans) before, weary from battle and travelling, her army succumbed to a Roman counterattack.

Legend has it that, to avoid capture by the Romans, Boudica killed herself with poison – an inglorious end to an outlaw who struck a legendary blow to the mighty Roman Empire.



Celtic leader Boudica was one of the few to beat the Romans in battle, if only for a few months



★03★ PANCHO VILLA

1878-1923

Not all of the outlaws in our roundup stuck purely to a life of crime. Some, like Mexican Doroteo Arango – better known as Pancho Villa, began as a renegade but 'went straight' later on, albeit in revolutionary circumstances.

After hunting down and killing a man he believed had sexually assaulted his sister, Villa lived life as a bandit in the hills of Durango, Mexico. After dices with the authorities, however, Villa mixed the life of an outlaw with legitimate pursuits. He was later convinced to join the Mexican Revolution and led armies against the government of the time. But when America intervened in 1916 – which coincidentally had been hunting for Villa due to his role in the revolution – Villa's power began to wane and he ultimately surrendered in exchange for a large swathe of land in Chihuahua. Villa was assassinated while he was driving in July 1923.

"Pancho Villa mixed the life of an outlaw with legitimate pursuits"

★02★

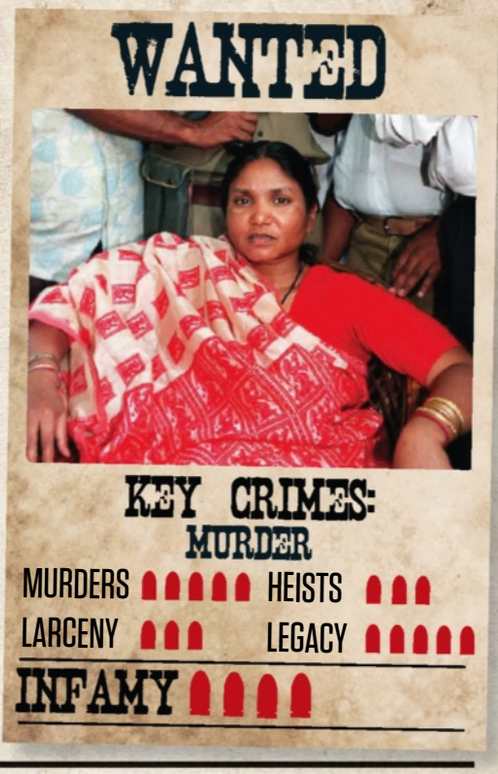
PHOOLAN DEVI

1963-2001

Phoolan Devi was the 'Bandit Queen' of the East, or more specifically India. Devi was born in the village of Ghura ka Purwa to a relatively poor family who were treated badly by those of a higher caste. Aged 11 Devi was married to an older man who abused her, but she managed to escape to work with her father and sister. She had a fiery temper, typified by her destroying a house they had built after the owner refused to pay for it.

She suffered further abuse – this time at the hands of some of her villagers – before leaders of the village handed her to a bandit gang in the hope they would be rid of her. It was a fatal error because, as it turned out, she became an integral member of the gang. She returned to the village and murdered all those that had abused her – a killing spree known as the Behmai Massacre.

In 1983, Devi and her gang surrendered after committing further crimes. She spent 11 years in prison before becoming an MP in 1996. However, she was assassinated in 2001 by a man claiming vengeance for the Behmai murders.



★01★

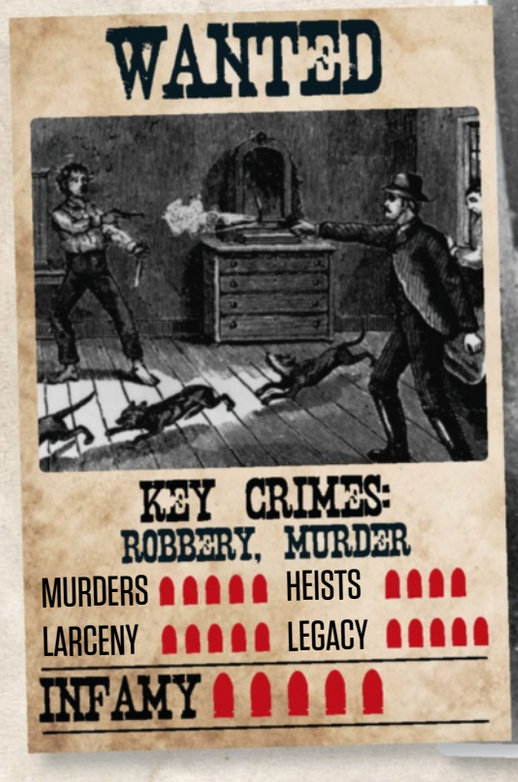
BILLY THE KID

1859-1881

Perhaps no name evokes the image of an outlaw more than that of Henry McCarty – more commonly known as Billy the Kid. His death at such a young age (21), coupled with some less than savoury pursuits, has seen this figure become a staple fixture of the American Wild West.

Although born in New York City, as he grew up McCarty and his family moved across the country to New Mexico via brief stints in Indiana and Kansas. With the death of his mother in 1874, McCarty soon turned to a life of crime. He was apprehended for a robbery at the age of 16 but fled to Arizona, where he became a prominent horse rustler.

A string of deaths followed McCarty. It's often said that he killed 21 men – one for each year of his life – although his true head count is thought to have been closer to nine. His last kills, however, were two guards holding him hostage after he had been found guilty of killing Sheriff William Brady. McCarty was gunned down at Fort Sumner, New Mexico, in 1881, bringing an end to a short-lived career but leaving a long-lasting legacy.





"It's often said that he killed 21 men – one for each year of his life"

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Imagine Publishing Ltd
Richmond House, 33 Richmond Hill
Bournemouth, Dorset, BH2 6EZ
☎ +44 (0) 1202 586200
Web: www.imagine-publishing.co.uk
www.greatdigitalmags.com
www.historyanswers.co.uk

Magazine team

Editor in Chief Dave Harfield
dave.harfield@imagine-publishing.co.uk
☎ 01202 586229

Staff Writer Chris Fenton
Senior Art Editor Helen Harris
Senior Sub Editor Adam Millward
Research Editor Jackie Snowden
Assistant Designer Benjamin Stanley
Photographer James Sheppard
Head of Publishing Aaron Asadi
Head of Design Ross Andrews

Contributors
Matthew Bennett, Andrew Brown, Jonathan Gordon, Jonathan Hatfull, James Hoare, Robert Jones, Martyn Landi, Jonathan O'Callaghan, Dave Roos, Gavin Thomas, Nigel Watson, Tim Williamson, Steve Wright

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Advertising
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Advertising Director Matthew Balch
☎ 01202 586437
matthew.balch@imagine-publishing.co.uk
Head of Sales Hang Deretz
☎ 01202 586442
hang.deretz@imagine-publishing.co.uk

Account Manager Liz Tucker
☎ 01202 586431
liz.tucker@imagine-publishing.co.uk

International
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Head of International Licensing Cathy Blackman
☎ +44 (0) 1202 586401
licensing@imagine-publishing.co.uk

Subscriptions
Head of Subscriptions Gill Lambert
☎ 0844 848 8408
Overseas +44 (0)1795 592 867
Email: allabouthistory@servicehelpline.co.uk
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Circulation
Head of Circulation Darren Pearce
☎ 01202 586200

Production
Production Director Jane Hawkins
☎ 01202 586200

Founders
Group Managing Director Damian Butt
Group Finance and Commercial Director Steven Boyd
Group Creative Director Mark Kendrick

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CAESAR
THE RISE TO POWER

How one man's ambition and genius transformed Rome from a republic to a dictatorship

Written by Jonathan Hatfull



From Caesar's birth in 100 BCE to the time he crossed the Rubicon River in a brazen act of rebellion in 49 BCE, the Roman Senate floor was a battleground, where power was taken by cunning, conspiracy and force. The powder keg had exploded into conflict in 88 BCE with the first in a series of civil wars and rebellions, with the conservative elite locked in combat with the growing ranks of populists; Rome was full of orators, soldiers and politicians fighting for control. Gaius Julius Caesar was all three.

Caesar knew exactly what he was capable of and what he wanted and, when Caesar saw an opportunity, he took it. His cunning, ruthlessness and the sheer scope of his ambition would change the landscape of western Europe and beyond. After decades of outrage and protest, adoration and adulation, only his murder could finally put a stop to Caesar's vision but, even as his blood cooled on the Senate floor, there could be no doubt that the change he brought about was irrevocable.

From a young age, Caesar showed the qualities that would propel him through the corrupt, backbiting world of Roman politics. In 82 BCE, when Caesar was roughly 18 years old, his family was in a precarious position. They were linked to the regime of the popular consul Gaius Marius by marriage, so when Marius's bitter enemy, Sulla, took power by force they had to capitulate to this new regime to survive.

Sulla ordered Caesar to abandon his position as high priest of Jupiter and to break off his marriage to Cornelia, the daughter of Marius's old ally Cinna. Showing a stubbornness that bordered on suicidal, Caesar refused to kneel and instead went into hiding until his mother could convince Sulla to give him a reprieve.

Instead of idly waiting for Sulla's forgiveness, Caesar took the first step on what would prove to be a long and illustrious career. He joined the military and travelled to Asia in service of the empire. He quickly proved himself in battle, earning the Civic Crown (one of the highest military decorations available to a Roman soldier) for saving the life of one of his men.

This dedication to his fellow soldiers would be a cornerstone of Caesar's life in the army, as he understood how vital the respect and loyalty of his men would be. His spotless reputation was threatened when he was sent to obtain a fleet from the Bithynian monarch Nicomedes though. Caesar spent so long at Nicomedes' court that word spread the young soldier was engaged in an affair with the king. Whether or not there was any truth to the rumour, Caesar denied it fiercely at every opportunity. While the rumour never quite went away, it didn't slow him down.

When Sulla died in 78 BCE, the stage was set for Caesar's return to Rome. He had proven himself as a soldier and now it was time to demonstrate one of



GAIUS JULIUS CAESAR

100-44 BCE

Brief Bio

Julius Caesar was a Roman general, statesman, consul and notable author of Latin prose. His strength as a military leader and a politician played a critical role in the events that led to the expansion of Roman territory, the demise of the Roman Republic and, from its ashes, the rise of the Roman Empire.

ROME BEFORE CAESAR

Before Caesar stepped onto the Senate floor, the Roman political system was divided in two: the optimates and the populists. Every politician stated their belief in freedom, but the problem was that the two groups had different ideas about what exactly freedom meant.

The Senate had become something close to a private club run by the optimates, where privilege, status and who you knew meant power. However, that libertarian ideal meant something very different to the populists, who made their voices heard in the People's Assembly. Both groups believed that they were acting in the best interests of the Republic, and both used the word 'liberty' in their manifestos, but they agreed on practically nothing, leading to political chaos.

The populists and conservatives would face each other in the Plebeian Assembly where they would fight for the popular vote. It would seem that the popular vote would surely have gone to the populists, but the conservatives had several points in their favour. The voters who could afford to travel from outside of Rome would often side with the elite, while others could easily be bribed. The outrage over this corruption, along with the government's military failures in Gaul and North Africa, led to a precarious state of affairs for anyone occupying the position of consul.

General Gaius Marius was elected to improve Rome's military operations overseas and was immensely popular. When Sulla, an optimate general, was elected for the same reason, the populists panicked and tried to recall him. An enraged Sulla responded by executing the tribune who had proposed the order and establishing himself as Rome's dictator, instigating Rome's first civil war. Marius and Sulla battled for power until the former died of natural causes, leaving Sulla without any opposition. He spent the remainder of his time in office working to diminish the influence of the populists and increase the power of the conservatives.

When Sulla himself died in 78 BCE, the people were desperate for a voice in the Senate, and Julius Caesar was ready to speak for them.



One of Caesar's staunchest opponents, Marcus Porcius Cato delivers a speech to the Senate

his other skills. He entered into the legal profession and used his other great talent: his voice. Caesar was a charismatic and persuasive public speaker and he used this skill to full effect. The Roman political system was in a constant state of imbalance between the wealthy elite that occupied the Senate and the populists who raged against such flagrant inequality. Caesar's gift for public speaking helped him to gain the support of the populace as he targeted corruption in the aristocracy. Caesar needed the people to love him and his every gesture was made with one eye on their reaction.

It wasn't just his grandstanding in the courthouse that was making him popular. The public loved a good story and Caesar had a knack for providing them. In 75 BCE he was captured by pirates while sailing to Greece, who planned on holding him to ransom to the tune of 20 talents of gold. Caesar had no intention of being ransomed for so paltry a sum and told them so. Instead, he convinced his captors to raise their price to 50.

The story that returned to Rome with Caesar was that the group kept up a lively, jovial atmosphere, in which the prisoner promised that, when he was released, he would hunt them down and kill them as punishment for their crimes. The pirates may not have taken him at his word and that would prove a fatal mistake. As soon as he was freed, Caesar led a group that captured, imprisoned and crucified them. Ruthless treatment indeed, but ever with an eye on the crowd Caesar showed a measure of mercy and ordered that their throats be slit first to spare them the agony of the execution. After all, they had treated him well.

An opportunity to face greater odds and test himself as a leader on the battlefield arose when fighting broke out in Asia Minor. Caesar raised a military force and defended Rome's territory long enough for his commanders to launch a counterattack. He returned home a hero and was promptly elected military tribune, followed by an appointment as quaestor (a kind of magistrate) for southern Spain and Portugal soon after.

This magisterial position put him in charge of finances in the region and gave him bureaucratic and administrative experience that would serve him well. When he returned to Rome for his Aunt Julia's funeral, Julius Caesar gave a eulogy that left nobody in any doubt about his ambition or his self-belief. In this speech, he reiterated that his late aunt's illustrious lineage could be traced back to the gods themselves. It would not have been lost on anyone present that Caesar was taking this opportunity to remind everyone that he was also from holy stock. A man descended from the gods would not be content with remaining a magistrate.

Now back in Rome, Caesar had taken his first steps on the political ladder and he quickly showed he wasn't going to stop climbing. Although he preached against corruption, Caesar was not above bribing anyone who might help him get what he wanted. As he leapfrogged from aedile in 65 BCE to high priest in 63 to praetor in 62, he was falling deeper into debt and making some formidable

"As he leapfrogged from aedile in 65 BCE to high priest in 63 to praetor in 62, he was falling deeper into debt and making some formidable enemies"

enemies – particularly the apparently incorruptible senator Marcus Porcius Cato (or Cato the Younger).

A nearly fatal stumble occurred when Caesar was forced to slip out of two scandals in quick succession. Many believed that he had been involved in Catiline's attempt to assassinate the then-consul Cicero, while he was forced to divorce his wife when it became clear that she'd been in part responsible for the Bona Dea scandal. While the former plot involved the overthrow of the government, the latter, in which it was clear that a man had attended an exclusively female religious ceremony and thus desecrated it, was far more embarrassing. Both were costly, and Caesar ended up bankrupting himself to stay above them. If he had any intention of going further – which he certainly did – Caesar not only needed more money, he needed to get some muscle on side.

Financial backing came from the extremely wealthy Marcus Crassus. Crassus had made his name as a young general fighting with Sulla, but his real talent lay with making money from properties and buying and selling slaves. Caesar's debts were so serious that he couldn't even leave Rome to start his new governorship in Spain before he made some repayments. Fortunately for Caesar, Crassus saw how popular Caesar was with the public and agreed to satisfy some of his creditors, allowing Caesar to go on to yet more military triumphs in his Spanish Wars.

He crushed the rebelling tribes and looted their cities, before helping the region extricate itself from debt. Once again, Caesar returned home a hero and with his eye on the next step up: the consulship. He was so determined to obtain the position that he passed up the opportunity for a military parade through the city in order to put his application forward before the deadline. Adulation could wait; his rise to power could not.

He may have had money and he certainly had popularity, but Caesar knew that he needed brute force to combat his enemies in the Senate and keep them quiet. In a moment of brilliant inspiration, he turned to a respected general and Crassus's bitterest rival, Gnaeus Pompeius – otherwise known as Pompey. In 62 BCE Pompey had returned from campaigns in Syria and Judaea that were so

CAESAR'S PATH TO THE TOP

Assuming dictatorial control over a republic requires a rigid career plan



69 BCE

In 69 BCE Caesar was elected quaestor for Baetica (Andalucía). The position was similar to that of a magistrate combined with an accountant; Caesar oversaw the finances of the region and conducted investigations where necessary. This role may have inspired his vision of a smoother-running empire and his later innovations to Roman infrastructure.

65 BCE

An aedile organised games and looked after Rome's public buildings and markets. Caesar used this position to win public favour by staging immense gladiatorial games, with over 640 gladiators. The Senate was wary of the furore of the event and set a limit on how many gladiators one man could keep, but the message was clear: Caesar knew what the common people wanted.

62 BCE

The praetor position combined the duties of an aedile and a quaestor. They were senior magistrates appointed to oversee civil matters, while others had specific courts to head up. In the absence of a consul, the praetor took power. Just one step before consulship, at this point Caesar's opponents were beginning to grow anxious as he showed no signs of slowing down.

59 BCE

The consulship was a presidential post shared by two men that had been established after the Romans abolished the monarchy. It came with a lot of power too as the consul had control of the Republic's finances, the military and the justice system. Although a consul was supposed to listen to the Senate's advice, they could not be tried until their term of office was over.

58 BCE

A governor, or proconsul, was a regional position that had many of the same duties as a consul. Lucrative and powerful, it was the traditional posting following a consulship, and a proconsul could not face prosecution until his term had finished. As governor of Gaul, Caesar added modern-day France and Belgium to the empire and ventured on expeditions to Britain.

49 BCE

The position of emperor came about as Caesar attempted to find a title that matched his responsibilities without being named king. He took on the duties of several different offices, such as praetor and consul, without taking the titles themselves. He was no longer obliged to take the Senate's advice and he involved himself deeply in all aspects of Rome's infrastructure.

"What came next was a political campaign so dirty and underhanded that even Cato, renowned for his honesty, was forced to resort to bribery to keep Caesar out"

successful it made the Roman senators nervous. In order to limit his power, they ignored his request to ratify the treaties he had secured and the promises he had made to his soldiers. The general was eager to lend his support to somebody who might get things done and restore his pride.

Caesar convinced Crassus and Pompey that the benefits of power were worth putting aside their differences and formed the First Triumvirate in 60 BCE. To seal their agreement, Pompey married Caesar's daughter Julia, while Caesar married Calpurnia – the daughter of a friend of Crassus. This political powerhouse terrified the Senate – particularly Cato – who set himself directly in opposition to the ambitious candidate.

What came next was a political campaign so dirty and underhanded that even Cato, renowned for his honesty, was forced to resort to bribery to keep Caesar out. It didn't work. With money, muscle and cunning, his campaign was unstoppable and Caesar was elected consul in 59 BCE.

While he took care of his friends (Pompey was appointed governor in Spain and Crassus a general), Caesar's time as consul cemented his reputation for ruthlessness. If his powers of persuasion weren't enough, Pompey's soldiers intimidated any opposition in the Senate. Caesar's co-consul (and Cato's son-in-law), Bibulus, could mutter about omens all he liked; he was intimidated and ignored to such an extent that the co-consul finally fled for the safety of his own home. It's rumoured that Pompey's soldiers even went as far as tipping a bucket of faeces over his head.

And Caesar didn't limit his rough treatment to his colleague. He imprisoned Cato for disagreeing with him and used Pompey's soldiers to clear the Forum of opposition. His methods were so outrageous it was certain that he would be tried for his crimes once he gave up office. Caesar was well aware of this and secured the position of proconsul in Gaul for a five-year tenure, despite Cato's objections, allowing him to leave Rome before he could be prosecuted. It was time for Caesar to face conflict on a much larger scale.

Cato was afraid that Caesar was going to use his position in Gaul to instigate conflict, and his concerns proved to be justified. Caesar immediately set about provoking Swiss tribe the Helvetii into an attack, which was the equivalent of a starter's pistol for years of relentless and wide-ranging campaigning. His attacks were ruthless and daring, and his responses to those of his enemies were quick-witted and precise.



The standard bearer of the 10th legion leading the charge onto British soil

The Gallic and Germanic tribes were subdued between 57-55 BCE, at which point he sailed for Great Britain. There was no lasting success across the Channel but, as Cato had feared, tales of his ambitious exploits were getting back to Rome. Word reached the Senate that Gaul was pacified in 53 BCE. Cato could declare that Caesar was acting in his own interests and not those of the empire, but the people loved him for protecting Rome. Time and again, Caesar knew how to endear himself to the masses and camped near to Italy in winter to allow stories of his victories – not to mention treasure – to trickle back.

Even as he waged war across northern Europe, Caesar was aware that his time as proconsul would have to end. He knew all too well that once he returned to Rome he would face a serious list of charges, both from his time as consul and as a general. His attacks in Germany were so savage and fierce that he was forced to spin them to avoid losing popularity. But the farther Caesar took his army, the greater fortune he amassed and the more soldiers he was able to recruit. Unlike the Roman centurions, these men from Gaul and Germany had no loyalty to the empire; they were loyal to their general, and Caesar rewarded them well for it.

Back in Rome, the Senate was fully aware of Caesar's brutal strategies and growing military strength. Keen to ensure that the trial of Julius Caesar should proceed as smoothly as possible, they reached out to Caesar's old friend Pompey. Their relationship had always been built on the foundation of the

THE FIRST TRIUMVIRATE

Assembled by Caesar himself, this trio formed the perfect balance of money, military might and political cunning



JULIUS CAESAR

While Crassus gave the triumvirate gold and Pompey gave it military muscle, Caesar brought the political savvy and the ambition. The difficulty of reconciling two men who hated each other so bitterly should not be underestimated, but Caesar convinced them that the rewards he could give them through his consulship would far outweigh any petty rivalry. Once the First Triumvirate was formed, Caesar used brutal tactics to make sure he got what he wanted. The campaign he ran was so dirty that the famously honest Cato was forced to resort to bribery to make sure his son-in-law was elected to co-consul.



MARCUS CRASSUS

Caesar needed financial support to run for consul and Crassus's wealth was notorious. He'd amassed a huge personal fortune through underhanded real-estate dealings, his mining operations, as well as slavery. Crassus was in a position to bankroll Caesar's military operations and to grease the palms of anyone who might be convinced to stand in his way. Once Caesar had convinced Crassus to overlook his long-standing rivalry with Pompey, the First Triumvirate had a bank. He would die fighting the Parthians, who reportedly poured molten gold into his mouth after executing him.



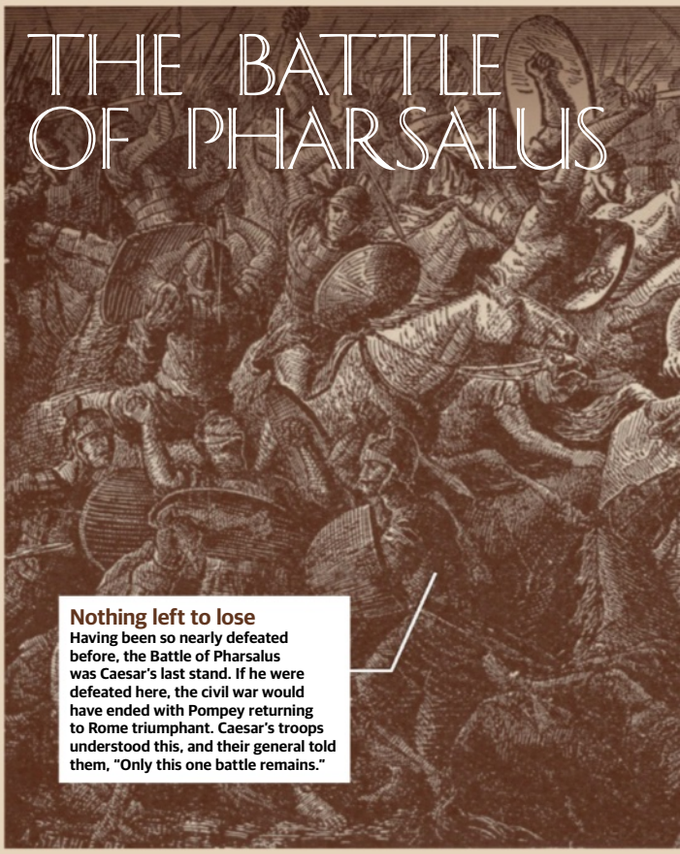
GNAEUS POMPEIUS

Pompey the Great was a renowned general who had served under Sulla. However, he was chafing under the new regime since they had not fulfilled the promises he had made to his troops in Syria and Judaea. He agreed to lend his muscle to Caesar's campaign in exchange for the guarantee that Caesar would make him a governor once elected. The deal was sealed with the marriage of Pompey to Caesar's daughter Julia and the general's troops began strong-arming and intimidating Caesar's opponents. However, once Caesar went to Gaul, Pompey quickly grew envious of his success and popularity.



Caesar crosses the Rubicon into Italy, plunging the Republic into civil war

THE BATTLE OF PHARSALUS



Nothing left to lose
Having been so nearly defeated before, the Battle of Pharsalus was Caesar's last stand. If he were defeated here, the civil war would have ended with Pompey returning to Rome triumphant. Caesar's troops understood this, and their general told them, "Only this one battle remains."

latter's marriage to Caesar's daughter Julia, who had died in 54 BCE. Crassus, the third part of the triumvirate, had died while fighting the Parthians in 53, and Pompey was growing ever-more jealous of Caesar's success and popularity. With no ties left to the triumvirate, the Senate understood that Pompey would begin to question his allegiance.

The test came when Pompey was elected to sole consul in 52 BCE to handle an outbreak of rioting and his success gained the approval of the aristocrats. Buoyed by his victory and sudden popularity in the Senate, Pompey was convinced that removing Caesar from the political scene was the right thing to do. It would not be that easy. At this point, an attack from Gallic chieftain Vercingetorix, who knew of the riots in Rome, nearly destroyed Caesar. The Roman general had laid siege to the chieftain, but was forced to set up a wall to their rear when Gallic reinforcements arrived. The Romans came perilously close to defeat but an extraordinary last-minute counterattack won the day and finally confirmed that Caesar had conquered Gaul.

In late-50 BCE, preparations were underway for Caesar's return. Both Pompey and Caesar were ordered by the Senate to hand back their powers. But Caesar had no intention of being tried for his crimes and planned to run for consul in absentia. He hoped that the popularity he'd built up during his years at war would push the Senate into allowing this, and had published an account of his wars in Gaul to help remind the public of his many brave and successful military campaigns. *The Gallic Wars* was written using powerful, emotive language that could be read by anyone, not just the well-educated elite. Unlike Pompey, Caesar wasn't talking to the boxes - he was addressing the entire theatre. Despite this, the Senate refused and demanded that Caesar hand over command of his armies and return to Rome to face his accusers.

On 10 January 49 BCE, Caesar had essentially run out of options. If he did what the Senate demanded, he would be prosecuted and all his work would be for nothing. On the other hand, if he did not, it was an act of war.

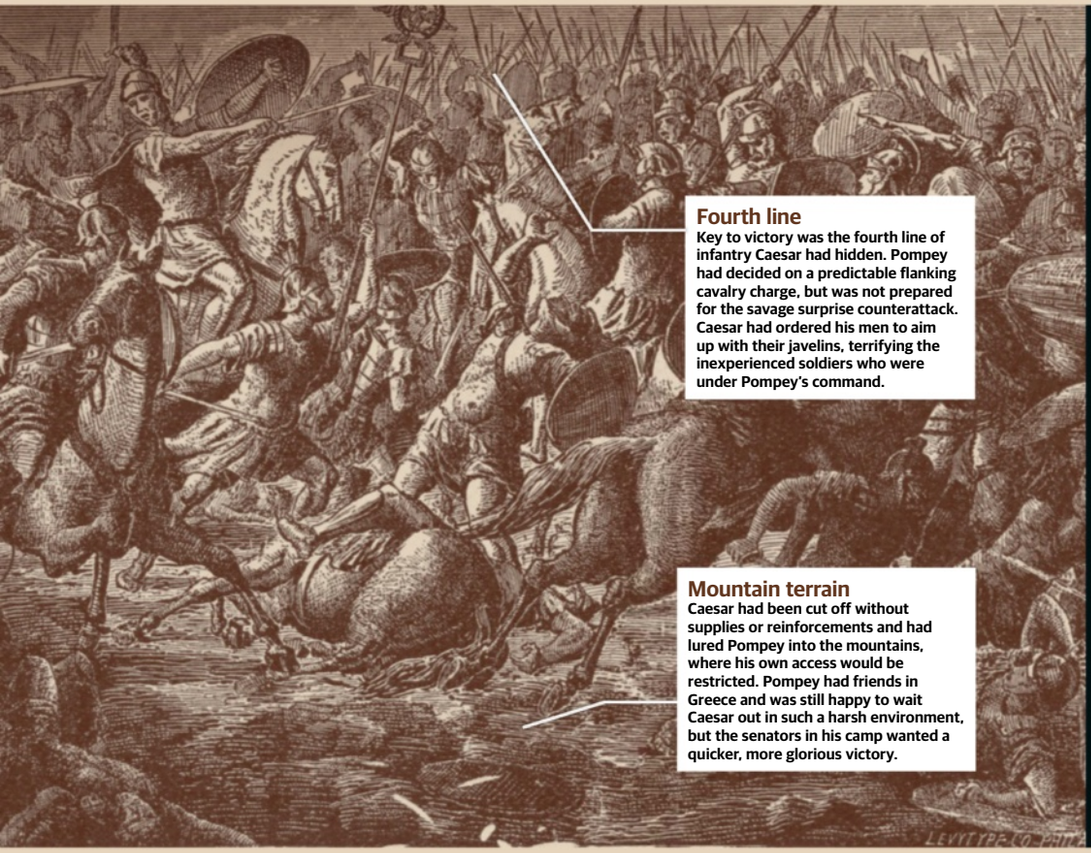
There are reports that Caesar was restless the night before, and even spoke with a spirit. Whatever happened and whatever hesitation he had felt, it was gone by morning. He assembled his forces and took the step that would change the course of history. "The die is cast," he proclaimed, and crossed the Rubicon River from Gaul into northern Italy. After decades of conflict with his enemies in the Senate, they were finally at war.

In their terror at his military might and daring, the Senate floundered. Caesar faced next to no opposition as he travelled into Italy. Pompey had blithely assumed that an attack wouldn't come until spring and most of his forces were still in Spain. After much panicked deliberating, Pompey announced that he would sail east to Greece to raise an army and that anybody opposing this plan would be a traitor. When Pompey slipped through his fingers, Caesar called a nearly deserted Senate together to approve military action in Spain.

While Pompey fled east , the new dictator wasted no time cutting a bloody swathe through his troops in the west. Pompey's forces were facing a determined, experienced army and Caesar's campaign was quick and brutal, decimating his opponents in just 27 days. Caesar then turned his attention back to his former ally and pursued him to Greece, where he was in the process of trying to raise another army. Caesar broke through a barricade set up by Bibulus, but he was cut off without supplies or reinforcements.

The subsequent fighting was disastrous and Caesar and his troops were on their last legs. Pompey had learned from his old friend's tactics in Gaul and set about starving his enemies. Caesar couldn't sit and wait Pompey out; if he was to win it would have to be on the battlefield. Finally, the two armies met at Pharsalus, where Caesar

> "Buoyed by his victory and popularity, Pompey was convinced that removing Caesar from the political scene was the right thing to do. It would not be that easy"



Fourth line
Key to victory was the fourth line of infantry Caesar had hidden. Pompey had decided on a predictable flanking cavalry charge, but was not prepared for the savage surprise counterattack. Caesar had ordered his men to aim up with their javelins, terrifying the inexperienced soldiers who were under Pompey's command.

Mountain terrain
Caesar had been cut off without supplies or reinforcements and had lured Pompey into the mountains, where his own access would be restricted. Pompey had friends in Greece and was still happy to wait Caesar out in such a harsh environment, but the senators in his camp wanted a quicker, more glorious victory.

Separated from his legions in Spain, Pompey had fled to Greece to raise another army. After decimating his old ally's forces in the west, Caesar followed him east.

Unlike Pompey, Caesar had no allies in Greece. He was outnumbered, and any reinforcements and supplies had been cut off. It was by sheer force of will that his army managed to keep up their campaign, but Caesar knew he was fast running out of time. He needed an even playing field and marched away from the sea and into the mountains, hoping Pompey would follow.

Pompey, meanwhile, had been buoyed by a major victory over Caesar's forces at Dyrrachium, but he was pained by the fact he could have beaten his enemy once and for all if he had pressed on. Once he caught up near Pharsalus, Pompey attempted to starve Caesar out, while Caesar in return wanted to coax him into open battle. The two sat at stalemate until Pompey's impatient senators told him they wanted victory now.

Despite holding the higher ground, the better supplies and the far superior numbers, Pompey used a tactic that Caesar knew all too well. While attempting to outflank Caesar's forces, Pompey did not see that his opponent had created a hidden fourth line of infantry. The flanking cavalry charged but did not anticipate the savage counterattack that followed. As instructed, Caesar's troops stabbed up at the cavalry with their javelins, terrifying Pompey's young aristocratic commanders who were unused to such a fierce tactic. The cavalry retreated and this fourth line gave chase, followed by the fresh third line. Pompey's forces were crushed and the general himself fled to Egypt. The decisive battle of the Caesar's Civil War had been won.

delivered a stunningly decisive victory against overwhelming odds (looked at in more detail in the boxout). Once again, Pompey was in the wind.

As Pompey fled south to Egypt, Caesar returned to Rome to pronounce himself dictator, but resigned after just 11 days before picking up the chase once again. However, if he expected a fight, he wasn't going to get one. Pompey had been betrayed by the very people he had sought sanctuary from, and his corpse was presented to Caesar by the child pharaoh Ptolemy XIII as a tribute. They didn't get the reaction they were expecting. Caesar was reduced to tears and ordered the execution of those who had slain his enemy. The final obstacle to his absolute power had been removed.

Looking out on the Nile, Caesar was able to see what such power could mean. He fell for Cleopatra after she reportedly smuggled herself into his rooms wrapped in a carpet and, acting out of sympathy for her and his own anger about the execution of Pompey, he fought with her against her brother Ptolemy in the Egyptian Civil War. The fighting that ensued was known as the Siege of Alexandria, during which Ptolemy refused Caesar's offers of peace and paid the ultimate price, drowning during the Battle of the Nile. The Egyptian queen claimed to have had a son named Caesarion with her lover, but he would never acknowledge that the boy was his. Once Cleopatra was firmly established on the throne of Egypt, Caesar sailed to Asia Minor to quash a rebellion led by Pharnaces. His victory was so swift that it led to his famous boast "Veni, vidi, vici." The words "I came, I saw, I conquered" weren't specific to this single battle. Caesar was unstoppable.

Even as he celebrated victory, Caesar knew he had spent too long abroad and needed to establish and maintain his power in Rome. It was vital that power be absolute, but gave the appearance of not being so. He was elected as Rome's dictator in 48 BCE for a term of one year. He spent this time mopping up the final resistance to his rule, including Pompey's sons in Spain and the elusive Cato in Utica, Tunisia. The hunt for the latter would take Caesar to North Africa, where he would defeat the troops of Scipio and offer them no mercy. In a final act of defiance, Cato took his own life rather than face an empire under Caesar's sole rule.

The Senate rewarded Caesar's triumphs by appointing him dictator for ten years. With Pompey's supporters disposed of, Caesar returned to Rome to reform the empire. His plan was threefold. He needed to ensure that there was no military resistance to him; he needed to deal with the serious debt that Rome had accumulated during its years at war; and he needed to turn the empire from a collection of states into one nation. Between 48 BCE and his assassination in 44, Caesar would show himself to be far more than a military dictator, not only laying the foundations for but taking the first decisive steps towards making the Roman Empire what it would become. The 60-odd men who conspired against and assassinated him in the Senate on 15 March 44 BCE may have succeeded in their task, but Caesar's legacy had long since been assured.

CAESAR THE DICTATOR

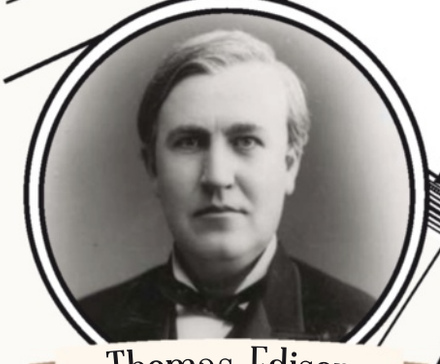
Throughout his regime, Caesar had used the approval of the people to his advantage. When he returned to Rome having defeated Pompey, Caesar knew it was crucial to keep the people onside. Mistakes were made along the way though. When he celebrated his win over Pompey's son in Spain, it was seen as a serious faux-pas as such festivities were reserved for victories over foreign foes, not the sons of former consuls.

His political reforms, however, addressed some of the major concerns many had aired. He understood that, if Rome was to truly be an empire, it could no longer hold back the benefits of living under Roman rule from those living outside Italy. With this in mind, he opened up citizenship to those living in Gaul, and encouraged people to relocate to the empire's territories. He reduced debt and he ensured that soldiers who had fought for him would have land to settle on. He also introduced the new calendar, aligning the months with the solar year rather than the Moon.

To ensure opposition against him in the Senate was minimal, Caesar expanded their ranks. Each position was now open to more candidates, making the aristocratic elite that opposed him less of a majority. Although he wore the purple robes of a king, sat on a throne in the Senate and had his face on the empire's coins, Caesar was careful to keep up appearances that he was a duly elected official. The ease with which his loyal general Mark Antony was able to step into power and pursue those who had assassinated Caesar shows the level of popularity the late ruler had maintained during his years as Rome's dictator.

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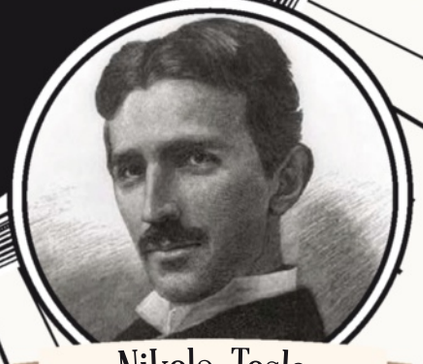
HOW THE WORLD TURNED ELECTRIC



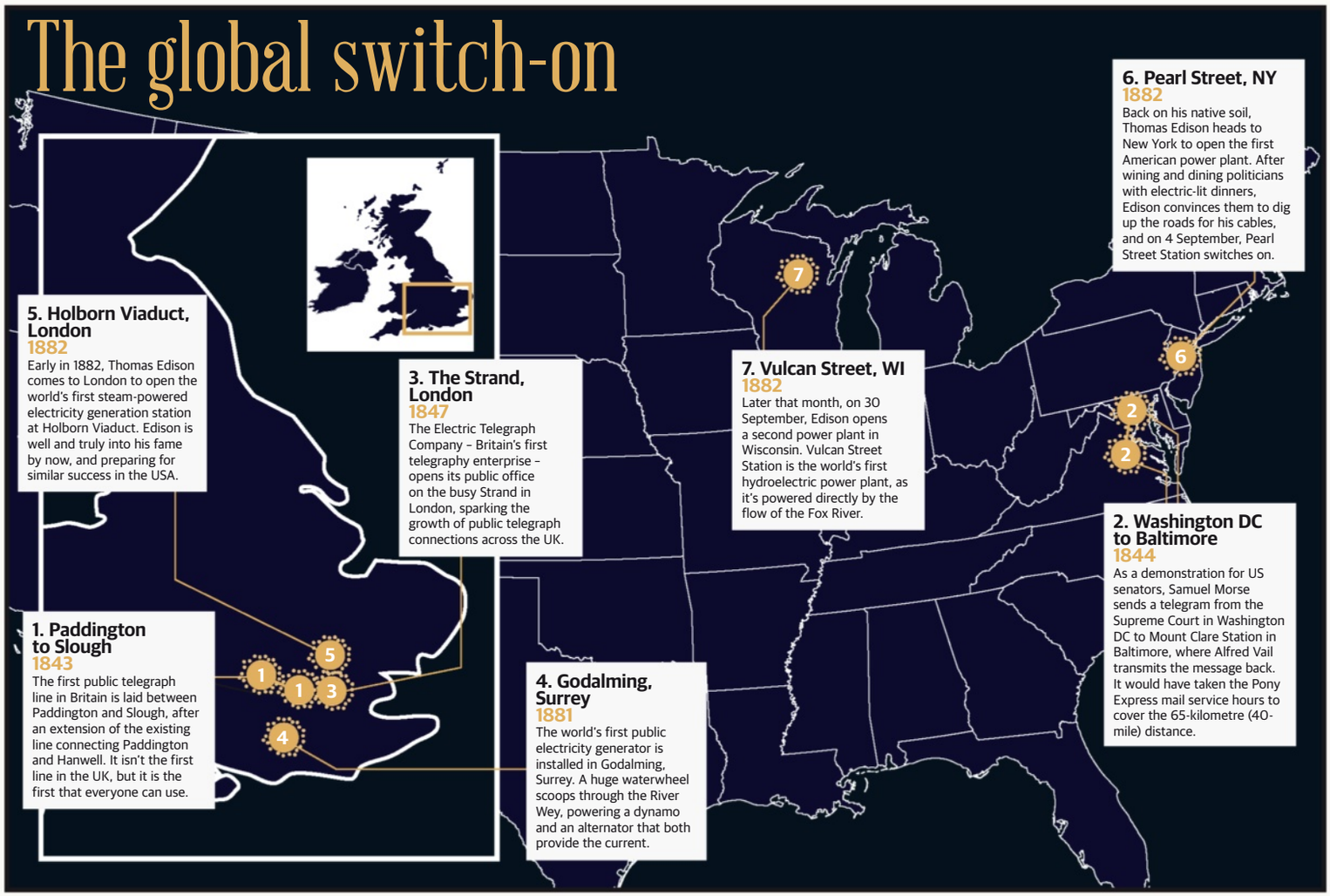
Thomas Edison

From battery to bulb, find out how electricity was harnessed and used to light up the planet, sparking the most productive period of technological innovation ever seen

Written by Gavin Thomas



Nikola Tesla



Menlo Park was aglow. After months of work at his New Jersey laboratory – not to mention hours of painstaking work to make the first filament, which had snapped – Thomas Alva Edison's light bulb had finally switched on in October 1879.

With the second filament fitted and all the air pumped out of the bulb using the latest suction equipment, the bulb was sealed. Inside, a small cotton sewing thread that had been lightly burned to coat it with carbon hung between the terminals of the electric circuit, and right then it was glowing with heat and light. The bulb burned all day, and once Edison connected the improved second bulb it burned for 40 hours. Staring at it, satisfied, he said, "I think I've got it. If it can burn 40 hours, I can make it last a hundred." He wasn't wrong.

This pivotal moment represented the point in the history of electricity that the spark – the idea of electricity – hit the filament and illuminated the real potential of electric energy for the whole world.

While the light bulb had already been invented, what Edison did was commercially produce it so that it was cost effective enough for everyone to afford, on the largest scale imaginable; he wanted to light up the world. And while he did, the story begins just over a hundred years earlier with an Italian scientist named Luigi Galvani, who noticed something peculiar about the frogs' legs he had been using for experiments in his laboratory.

Galvani, from Bologna, had observed that, whether it was thundering outside or a fine afternoon, the frogs' legs would occasionally twitch. A physician, physicist and philosopher, he was investigating all kinds of things with gusto, and on this occasion it was bioelectricity. He had hung the legs with brass and iron, so he surmised that fluid in and on the limbs was conducting electricity somehow, and he was determined to work out how it made the muscles jerk. He wrote an essay about it – titled *Commentary On The Effect Of Electricity On Muscular Motion* (published in 1791) – which was later read by a physicist from Como in northern Italy called Alessandro Volta.

Volta – for whom the volt (the unit for electrical potential) was named – read this report and heartily disagreed. He set about to disprove the findings of Galvani's research, and began repeating the experiment soon after the paper's publication.

He discovered that there was indeed the occasional jolt of the leg – a result of the reaction between the dead frog, his metal knife and the metal table in his workshop. Clearly, the leg was conducting electricity between the two different kinds of metal. Encouraged, he continued to experiment using different kinds of metal. It was crucial work, because the great switch-on wouldn't have been possible if it hadn't been for Volta's development of the battery.

His work progressed and he eventually moved from pegs and nails to plates of solid zinc and silver, with salt-soaked cardboard pads that sat between them – in place of frog legs. Each pair of plates, or cell, would provide a little electricity if a circuit was made using the two terminals: one zinc and one silver. When Volta stacked the cells up in 1800 he found that they produced far more

"It was crucial work, because the great switch-on wouldn't have been possible if it hadn't been for Volta's battery"

"By 1801 Volta was so famous that he got to show his pile to Napoleon Bonaparte, who made him a count and a senator"

Founding Father Benjamin Franklin was the first to invent the lightning rod in the mid-18th century



Key experiment: fact or fiction?

Thought by many to be a myth – though it may have been inspired by earlier European experiments – Benjamin Franklin's key experiment led to a greater understanding of lightning conduction, though the real facts are somewhat shrouded. While Franklin didn't document the experiment himself, he did tell Joseph Priestley – an English polymath known for his sermons, metaphysical texts and political works – who then wrote down an account of his tale.

The story goes that Franklin was in Philadelphia one dark June afternoon in 1752, looking up at the steeple of Christ Church. He was waiting for his new lightning rod to be installed at the top and growing impatient. What he wanted was to come up with a way to 'draw the electrical fire silently out of a cloud before it came nigh to strike', and so protect people from the skies. Staring at the spire, he wondered if he could fly a kite right into the storm clouds, where it would be surrounded by thunderous opportunities.

First, Franklin tied a silk ribbon to the loop of a key; this was his handle and it had to remain dry. Then he took another silk ribbon, tied that to the key, and also to the end of a kite string; this would get wet in the rain, and the water would conduct the electricity into the key. With his son William watching, Franklin sent the kite aloft. He found that, when his knuckles moved near the wet string, he got a little shock. Lightning rods would save countless others from much bigger shocks.

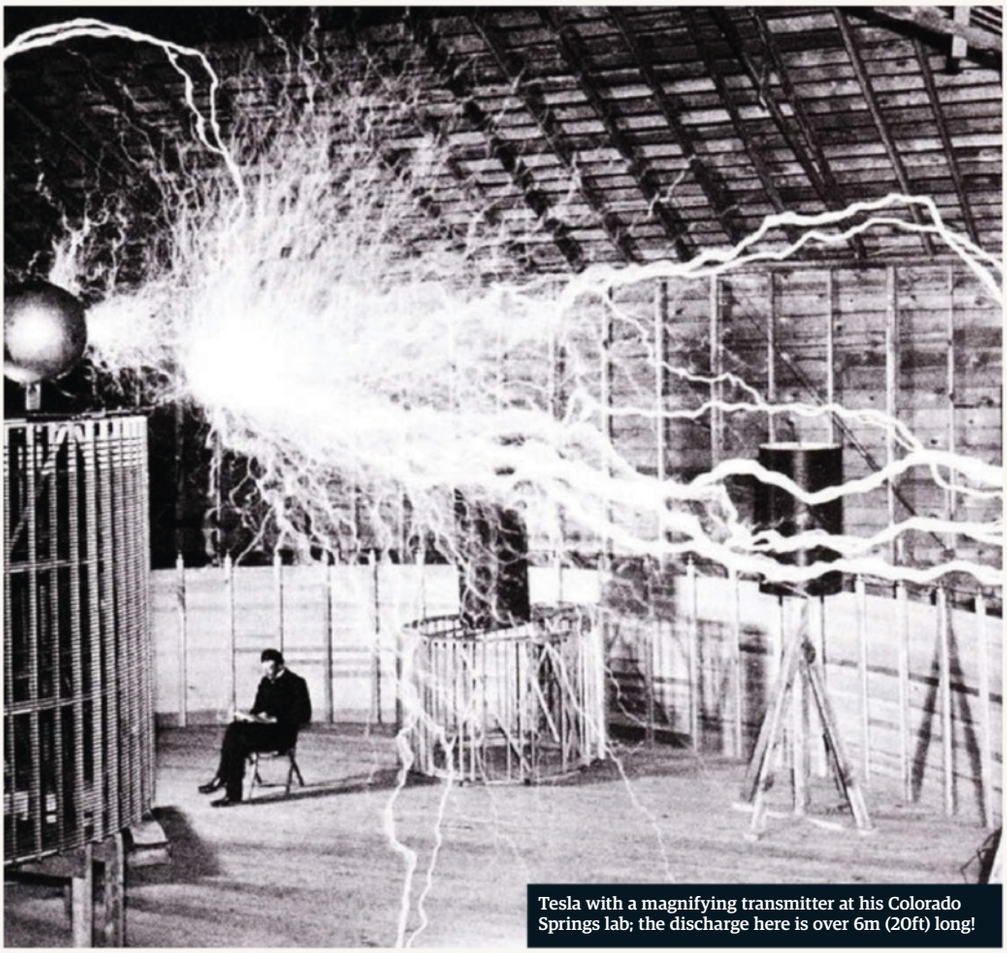
power collectively, and so the first voltaic pile – the earliest battery – was created. By 1801 he was so famous for it that he even got to show it to the emperor of France, Napoleon Bonaparte, who made him a count and a senator. It was the first time in history that someone had managed to store electricity for future use, and it paved the way for the development of generators.

Just two decades later, the English scientist Michael Faraday had produced the first ever motor that was powered by a battery. He'd been inspired by the work of people like Hans Ørsted, who discovered electromagnetism, and also William Wollaston and Humphry Davy, with whom he'd been discussing the problem of electric motors before creating his series of homopolar motors.

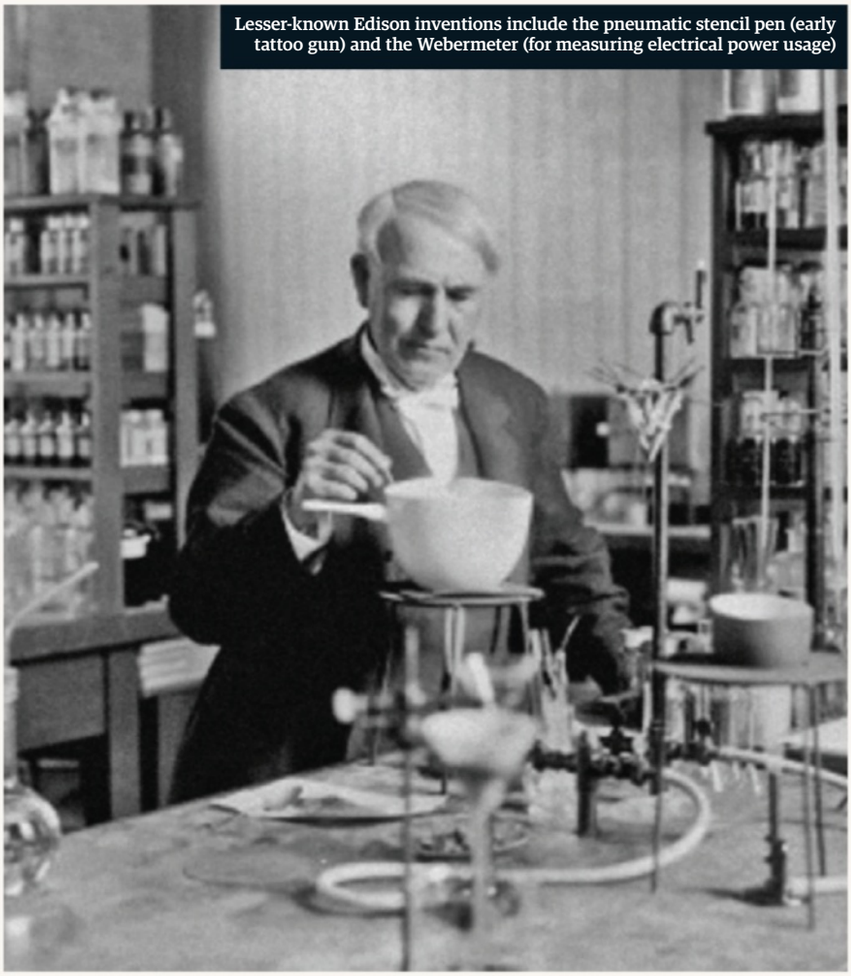
While the earlier models were too inefficient to use, in 1831 he had produced the first electromagnetic generator, based upon the principle of electromagnetic induction that he'd established the year before. These generators turned mechanical energy – eventually driven by steam power – into electrical energy, and were a vital element of the great switch-on.

The generators provided a steady voltage – in both senses – that could be used for all sorts of things, like sending and receiving Victorian text messages via the telegraph. Since electricity had been brought down to Earth and laid in cables, there had been an explosion of creativity among scientists, engineers, craftsmen and general tinkerers everywhere, and as such a number of people were working on this innovation at the same time. The telegraph connected two places by means of a long wire, through which a message could be encoded in the pulses of current that travelled along it, enabling information to be exchanged at an astonishing rate.

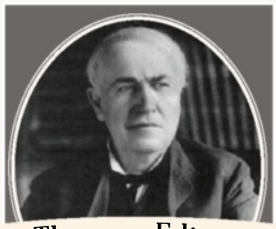
The first public telegraph lines were laid in England between Paddington and Slough – a distance of about 32 kilometres (20 miles) – in 1843, and on 24 May the following year Alfred Vail and Samuel Morse displayed the telegraph in action to a group of US senators. Morse sent a message – 'What hath God wrought?' – from the Supreme Court in Washington DC to Mount Clare Station in Baltimore, where his colleague then transmitted back to Morse. It travelled faster than an express train, and certainly faster than the Pony Express. Back in London, 1847 saw the Electric Telegraph Company open its Strand office to the public, offering pay-per-ticket access to the machines. In Ohio, it saw the birth of the most influential figure in the great switch-on: Thomas Edison.



Tesla with a magnifying transmitter at his Colorado Springs lab; the discharge here is over 6m (20ft) long!



Lesser-known Edison inventions include the pneumatic stencil pen (early tattoo gun) and the Webermeter (for measuring electrical power usage)



Thomas Edison

American

1847-1931

A ruthlessly determined, hard-working engineer, inventor and note-taker (he filled over 3,500 notebooks documenting his ideas and experiments), Edison started life as a young entrepreneur before taking his skills out to a bigger field. He put the first power stations on the American map, and created wonders from the light bulb to the gramophone.

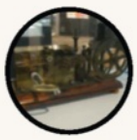
Born an entrepreneur, Edison – or Al, as he was then known – had always had an eye for business, and growing up in Port Huron, MI, he never missed an opportunity. He was selling newspapers in town one day in 1862, while the Battle of Shiloh raged in Tennessee, and wondering if he could somehow get the word out. Telegraphs were indispensable during the Civil War and had been used to carry field reports back and forth since the year before. Al convinced his friend in Detroit, MI – a fellow telegrapher – to wire newsflashes over to him, and as they came in Al then chalked up live battle updates onto his headline boards. He was 15 years old, and sold hundreds of newspapers that day, at twice the usual price. A tireless inventor in later life, young Al was quite the telegrapher in those days, once beating the fastest sender in New York in a telegraphing race. He taunted the frustrated New Yorker with the quip, "Say, young man, change off, and send with the other foot!"

Instant communication changed the world, and electric generators made it possible. Telegraphs, however, were only the beginning. Telephones were about to make it possible to speak with your own voice, rather than learn Vail and Morse's complex code and tap out messages, and this was down to a Scottish-born inventor called Alexander Graham Bell who later became a naturalised US citizen. He founded a school in 1872 for the deaf and spent much of his life working on the electric hearing aid, motivated to help his wife, Mabel Hubbard, who was deaf. While he may not have been the first

Light bulb moments



Volta: the first pile (battery)
1800



Faraday: first dynamo
1817

Faraday: first electromagnetic generator
1831

Morse & Vail: send the first telegram
1844



Bell: first commercial telephones
1877

Bell: first telephone call
1876



Edison: first phonograph (gramophone)
1877

Edison: first commercially viable light bulb
1879



The Electrical Exhibition at Crystal Palace, London
1882

A printing works: first electric-lit factory
1881



Pearl Street, New York: first power station
1882

Vulcan Street, Wisconsin: first hydroelectric power plant
1882



Marconi: first radio transmitter patented
1896

Edison General Electric formed – later just GE
1890

Baird: first TV transmission
1925



Thomas Edison performing spectacular light shows at his Menlo Park lab in New Jersey

The early notions

Electricity is a very slippery subject – even today. Due to the sheer number of different ways that we use the word, it can be confusing – and early investigators of electromagnetism had another problem to deal with: namely, a fuzzy belief in a kind of liquid that permeated the universe, called the aether.

The aether goes back to 1638, when the natural philosopher René Descartes was trying to deduce how light worked. He had already come up with three different types of matter from which he believed the universe was made, and now he was theorising that light was actually a pressure wave that travelled through one of these types of matter.

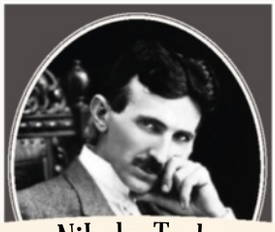
In order to make his model work, he had to work backwards to identify the properties of this type of matter that would lead to the correct calculations of the reflection and refraction of light. As it turned out, it worked kind of like a liquid, and so the notion of the aether was born. Thinking in terms of fluids persisted for a very long time, leading to our conception of the 'flow' of electric current.

person to invent it, it did lead to the development of his telephone.

The first telephone call ever placed was to Bell's assistant, Thomas Watson, on 10 March 1876. "Mr Watson, come here, I want to see you," were the first words uttered on the phone, picked up by the receiving microphone. The device spread like wildfire. Bell and the Bell Company (later AT&T) would be forced to defend its patent in around 600 legal cases. Meanwhile, Edison had moved to a lab in Menlo Park, NJ, where he began improving the telephone.

A year later, in 1877, he was experimenting with a diaphragm one day, watching it vibrate, and it occurred to him that the vibrations from the diaphragm would make a stylus joggle up and down. He tested the idea out, and managed to make some dents in a piece of paper by reciting the nursery rhyme *Mary Had A Little Lamb*; when he pushed the stylus back through the dents, he could hear the sound that he had recorded in the paper. This invention led to the creation of the phonograph, later called the gramophone, and the first known recordings of nurse Florence Nightingale, explorer Henry Stanley and poet laureate Alfred Tennyson.

This work on sound recording contributed to Edison's (and his team's) work on a new carbon microphone, which was louder, clearer and



Nikola Tesla

Serbian

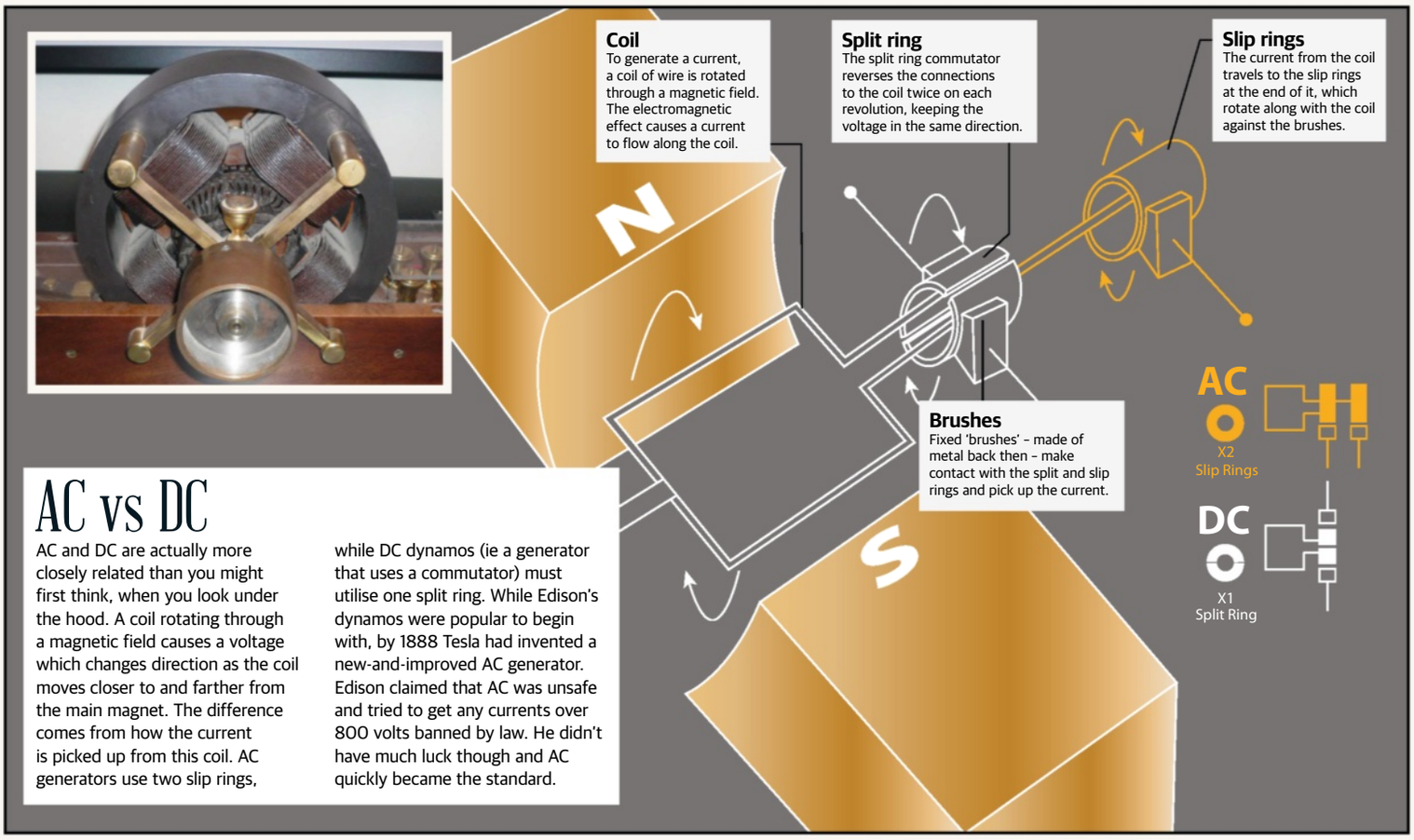
1856-1943

A physicist and electrical engineer famous for his development of the induction motor, a wide range of electrical devices and a power system that bettered Edison's own pioneering works, Tesla was a proponent of alternating current – the type we all use today when we access mains electricity from the wall.

worked across a much greater range. Western Union bought his improved telephone (aka the 'speaking telegraph') for $100,000, and Edison asked to be paid the sum in annual instalments for 17 years. He had set himself up for life and could now dedicate himself wholly to his original task: to bring electricity to the world.

Many people had been trying to develop the electric light. Since the 1840s, they'd been passing currents through platinum or carbon filaments inside vacuum-filled bulbs of glass. The problem was that they burned out too quickly. Joseph Swan had led the charge in Britain, with his battery-powered bulb in 1860, but his vacuum was too poor to sustain the right conditions.

He continued working late into the 1880s, but it was Edison who realised the light bulb commercially following his success with the first two bulbs, which used the latest air pump to achieve a better vacuum. Since then, Menlo Park had been gathering crowds who travelled for miles to enjoy the spectacle – though Edison and Swan did team up later to fend off competitors, with Edison beginning to release bulbs of varying sizes and shapes to saturate the market. In 1881 the first electric light bulb factories opened in Newark, NJ, in the USA and Benwell, Newcastle, UK, and heavy



AC vs DC

AC and DC are actually more closely related than you might first think, when you look under the hood. A coil rotating through a magnetic field causes a voltage which changes direction as the coil moves closer to and farther from the main magnet. The difference comes from how the current is picked up from this coil. AC generators use two slip rings, while DC dynamos (ie a generator that uses a commutator) must utilise one split ring. While Edison's dynamos were popular to begin with, by 1888 Tesla had invented a new-and-improved AC generator. Edison claimed that AC was unsafe and tried to get any currents over 800 volts banned by law. He didn't have much luck though and AC quickly became the standard.

generators, like steam engine 'Long-waisted Mary Ann', were used to power bigger machines. But Edison wasn't about to rest on his laurels.

He started planning a new kind of infrastructure. Edison was going to divide a city into sections, each connected to the main generator, in order to provide power to anywhere needed, so long as you could connect to a grid of cables. This meant that he and his team had to design new generators, cables, fuses, switches, meters, junction boxes and insulators, because none of them existed yet. Most people still read by candlelight, with the exception of JP Morgan in New York, who had electric power for his lights from a steam boiler in his basement.

Pearl Street in New York was the first power station to fire up on 4 September 1882. Five companies had scrambled to light the city, but Edison had won the politicians over with a deftly electric-lit dinner at Menlo Park, where they agreed to dig up their streets for his cables. The lights came on at 3pm, and one New York journalist later commented, "It seemed almost like writing by daylight." At one point a fuse blew, but Edison took off his smart clothes and hat to get down there and mend it himself. By 30 September, the Vulcan Street plant in Wisconsin had revved up too, and this was the first hydroelectric plant.

Pearl Street was supplying 231 customers by January 1883 – almost double that by August – and light bulbs lasted for 400 hours. The technology was continually improving, and Edison walked down the streets each night, proudly watching more and more of his light bulbs switch on.

> "Their animosity was so bitter that, in 1912, Tesla refused to share the Nobel Prize for Physics with Edison"

It wasn't all plain sailing though. Nikola Tesla, the Serbian scientist who had arrived in America in 1884, filed a patent for his improved electric motor in 1888 – two years before Edison set up the Edison General Electric Company. Edison championed the direct current (DC), which flowed in one direction and provided a safe voltage of 250 volts; however, its relatively low voltage meant that it was too weak to be sent across long distances.

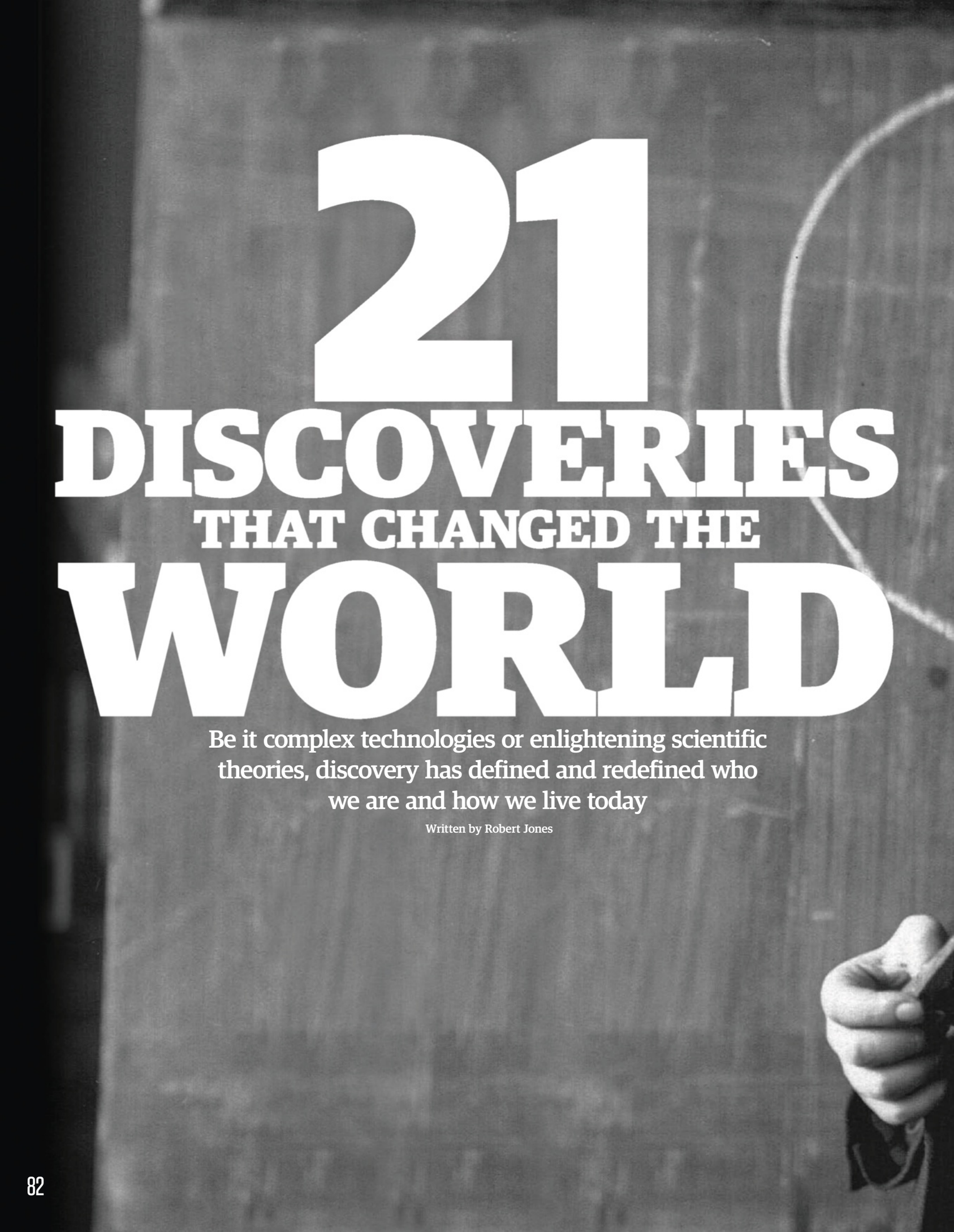
Alternating current (AC), on the other hand, flowed in pulses – first one way, building up in strength, then reversing direction – many times each second, which meant it could travel at a high enough voltage to allow for a low enough current, and not destroy power lines. Despite Edison claiming it was unsafe and trying to get currents over 800 volts banned, Tesla's new invention was bought by Edison's rival George Westinghouse.

DC generators were quickly replaced by the superior AC generators, and relations were sour between Tesla and Edison. Tesla claimed that Edison had cheated him out of a $50,000 bonus for improving the dynamo while he was working for him, but Edison said he'd been joking. Their animosity was so bitter that, in 1912, Tesla refused to share the Nobel Prize for Physics with Edison, and so neither of them ended up winning it.

Still, the impact that they had on the world has been indelible. From the battery to the bulb, the spark of electricity had travelled down history to these two men, and their generators put power in the households of first London and New York, then the planet. Guglielmo Marconi had developed the radio transmitter by 1896, though had Edison gone a few steps further in his research he would have predated this invention by 20 years, and John Logie Baird transmitted the first television pictures by 1925. These were recorded using a 'scanning' disc, invented by Paul Nipkow, that controlled the amount of light from particular areas of the subject being filmed as it hit photoelectric cells.

Electricity was everywhere and it changed everything. When Edison died in 1931, the electric lights of America were switched off or dimmed in his honour. For a minute, the country was as dark as it had been during the Civil War, when young Al was listening to the telegraph humming with news and dreaming up ways to make his fortune.

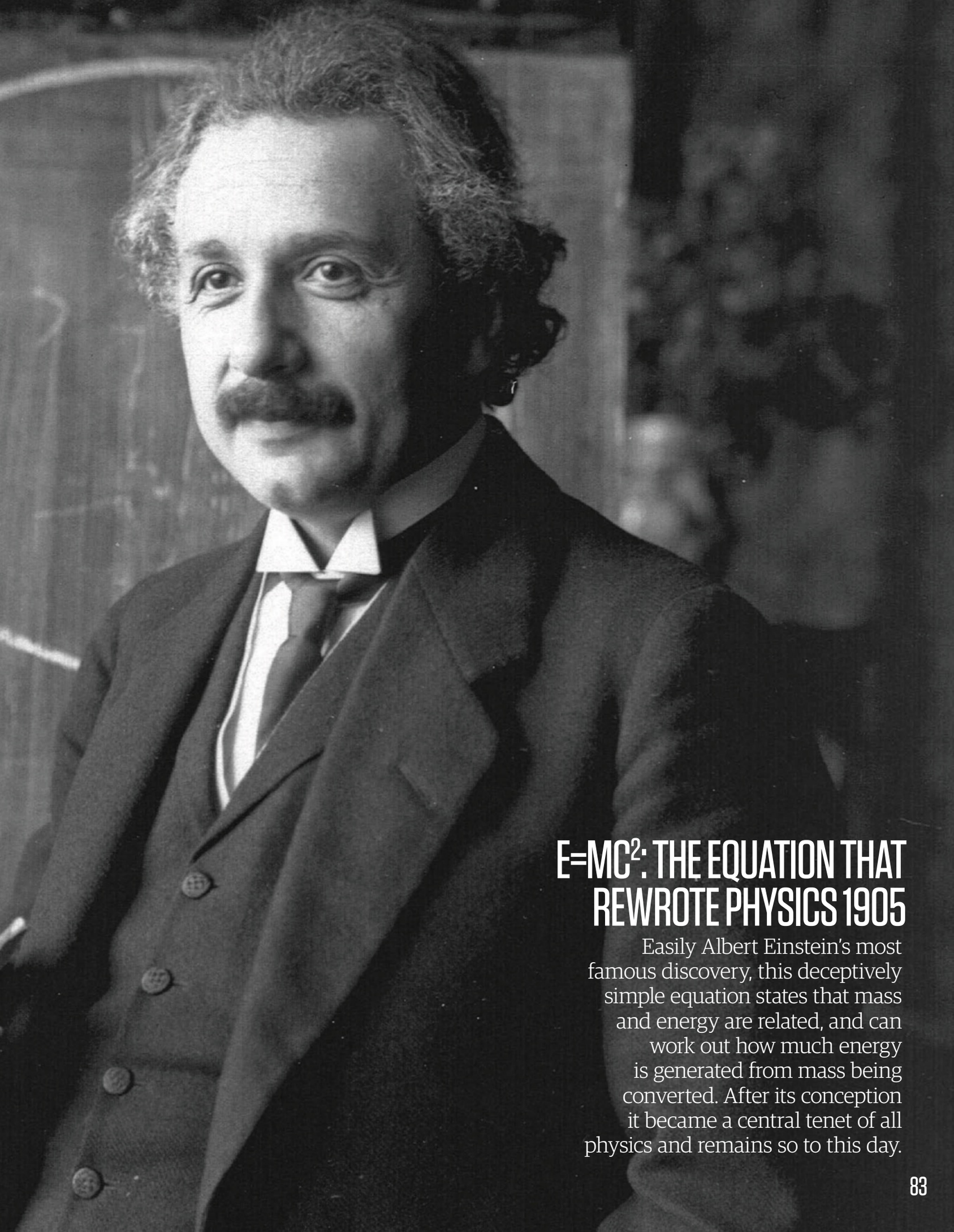
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21 DISCOVERIES THAT CHANGED THE WORLD

Be it complex technologies or enlightening scientific theories, discovery has defined and redefined who we are and how we live today

Written by Robert Jones



$E=MC^2$: THE EQUATION THAT REWROTE PHYSICS 1905

Easily Albert Einstein's most famous discovery, this deceptively simple equation states that mass and energy are related, and can work out how much energy is generated from mass being converted. After its conception it became a central tenet of all physics and remains so to this day.



While it's myth the apple fell on Isaac Newton's head, the apple inspiring him is thought to be true

NEWTON'S LAWS OF GRAVITY 1687

Prior to Isaac Newton's revelation of the force of gravity the question of why objects were bound to the Earth was limited to quasi-mystical explanations. However, when Newton introduced his law of universal gravitation in *Principia Mathematica* in 1687, he helped lay down a coherent explanation of how the physical world worked that would dominate science for centuries. The theory of gravitation was, according to Newton himself – who liked to repeat the story to colleagues – first formulated as he sat in Cambridge's Trinity College (though alternative locations have been claimed) and witnessed an apple fall from a tree. While it is myth that the apple fell on Newton's head, texts from the time – such as William Stukeley's *Memoirs Of Sir Isaac Newton's Life* – confirm the incident, with Newton being inspired to determine why that apple should always descend perpendicularly to the ground.

"Newton helped lay down a coherent explanation of how the world worked"

Calculus – the science of change 1687

Today, calculus has innumerable uses in the spheres of science, economics and education. The precursor to modern calculus was discovered in the 17th century, when English mathematician Isaac Newton and German mathematician Gottfried Leibniz both created their own systems. Newton's was based on the idea that change was a variable over time, while Leibniz's was based on the difference ranging over a sequence of infinitely close values.

UNRAVELLING THE TRUE NATURE OF DNA 1953

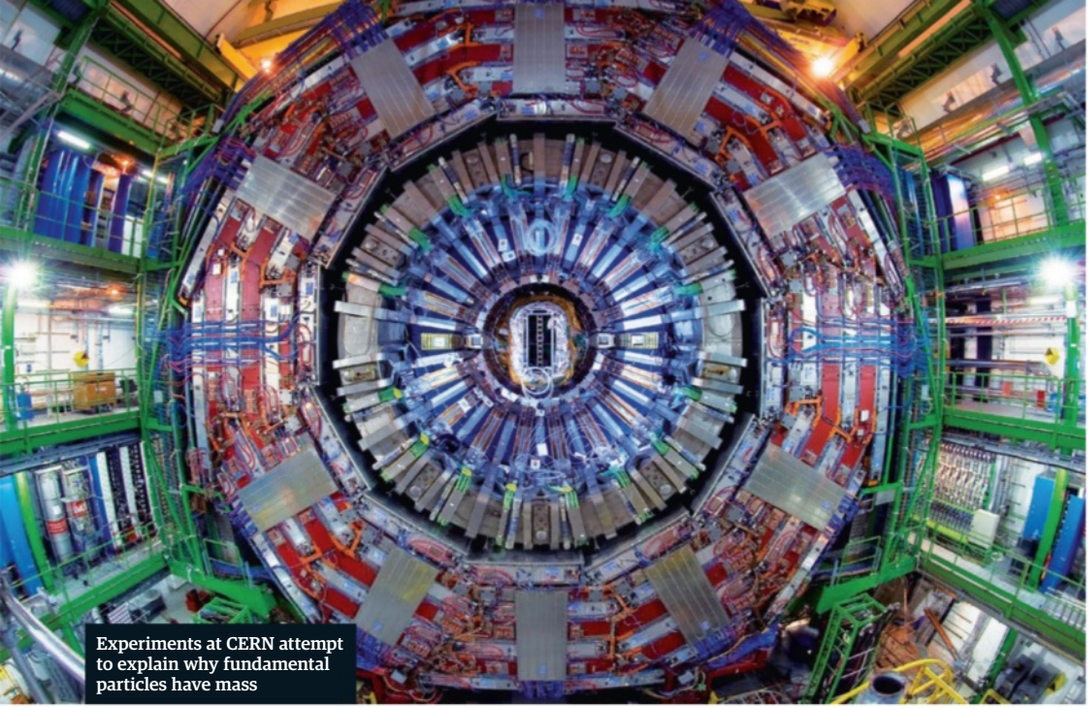
The tale of the discovery of DNA (deoxyribonucleic acid) begins with a Swiss physician and biologist named Johannes Friedrich Miescher. Originally training to become a doctor, after suffering a severe bout of typhoid fever that damaged his hearing, he was forced to abandon that vocation and instead turned to physiological chemistry. He thought at first he would study lymphocytes (one type of white blood cell), but was subsequently pointed in the direction of leukocytes (all white blood cells) by German biochemist Felix Hoppe-Seyler. As far as the world of science is concerned, it was very fortunate he did!



After filtering cell samples, Miescher attempted to isolate the nuclei from the cytoplasm, which he achieved by subjecting the nuclei to an alkaline extraction and then acidification. The result? Something that Miescher called nuclein, which today we know as DNA.

Interestingly, while Miescher and his fellow researchers continued to study nucleic acids for several years, they didn't realise DNA's significance at the time, with its double helix structure and true nature only hit on later by American James Watson and Englishman Francis Crick in 1953. Today, of course, DNA has been studied extensively and revealed to be responsible for the encoding of genetic instructions in the functioning of every living organism on the planet.

"After a bout of typhoid he was forced to abandon training to become a doctor"



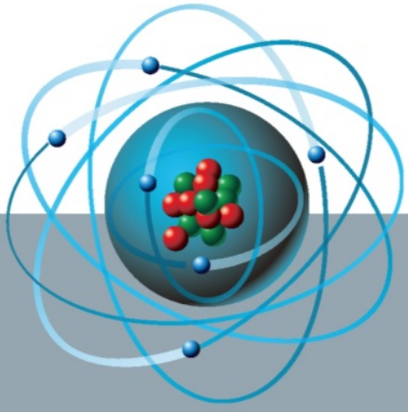
Experiments at CERN attempt to explain why fundamental particles have mass

SEARCH FOR THE GOD PARTICLE 2012

The Large Hadron Collider provided the final piece in the physics puzzle

The Higgs boson's tentative confirmation on 14 March 2013 ended an almost 50-year search for the elementary particle. Originally theorised to exist in 1964 by Peter Higgs and five others, the boson's discovery in July 2012 is a milestone, as it is considered the pivotal missing element in the Standard Model of physics. It explains why fundamental particles have mass – a key building block for the construction of the universe.

Interestingly, despite its discovery being considered monumental, at this present juncture there is no immediate benefit that the Higgs boson brings. Scientifically, if it were conclusively proven to exist, then it could answer many currently unexplained questions such as how particles gain mass, how cosmic inflation occurs and even what might happen to the universe in the far future. However, finding the Higgs boson in the Large Hadron Collider at CERN is purely academic. Whether or not it will have an impact on society later – much like quantum mechanics from the early-20th century – remains to be seen.



THE MIGHTY ATOM 1808

Nothing can come from nothing – so modern physics tells us. And this is the exact thinking pioneered by Ancient Greek philosopher Democritus in the fifth century BCE. He eventually concluded that everything in the cosmos was constructed from tiny, invisible particles called 'atamos' (meaning 'indivisible'). This was the birth of atomic theory and a crude notion of atoms that would remain largely unchallenged until the 19th century. Indeed, nothing really changed until English scientist John Dalton produced his own atomic theory, published in *A New System Of Chemical Philosophy* in 1808. This is considered the birth of modern atomic theory, as it eloquently describes how elements are made from extremely small particles called atoms and that atoms of different elements combine to form compounds. Of course, one thing Dalton didn't realise was that atoms could be split – something that would be achieved just over a century later by New Zealand-born scientist Ernest Rutherford.

THE ALL-SEEING RAY 1895

Wilhelm Röntgen's discovery of the X-ray let us see inside the body for the first time



The first X-ray produced was of the hand of Röntgen's wife (inset)

German physicist Wilhelm Röntgen first found the electromagnetic radiation X-rays in 1895. He not only discovered them but was the first to call them 'X-rays'; they were originally referred to by the establishment as 'Röntgen rays'. His breakthrough was the result of studying Crookes tubes – experimental discharge tubes invented by scientists investigating cathode rays and tubes in the 1870s. They were the precursor to the cathode-ray tubes used in computer monitors and televisions.

These discharge tubes generated free electrons that were accelerated out of the devices at such high speed that, when they hit the glass walls of the cylinder, they produced X-rays. Röntgen studied this phenomenon extensively, creating numerous X-ray images – the first of which was of his wife's hand. From this point on, the potential of X-rays became ever-more evident, with numerous applications emerging from precise, full-body medical X-rays through to the X-ray microscope and the high-powered X-ray-producing synchrotron devices capable of imaging cells and soft tissues in unprecedented detail today.

ORIGIN OF THE UNIVERSE 1931

Georges Lemaître publishes his Hypothesis Of The Primeval Atom, becoming the first to accurately describe the Big Bang

If you are looking for discoveries that broadened humanity's horizons then look no further than the Big Bang theory. For thousands of years the origins of the Earth and the universe had been held captive by a mixture of ignorance and religious scripture. Of course, while the Big Bang theory still remains a theory, it provides a plausible model for its formation and continued activity – one that is increasingly being backed up by scientific evidence.

The origin of the Big Bang theory emerges with, interestingly, a Catholic priest and scientist called Georges Lemaître, who in 1931 published his *Hypothesis Of The Primeval Atom*. Here Lemaître proposed a model of the universe beginning with a cataclysmic explosion that is still expanding – and at an accelerated rate. Despite rival theories from Edwin Hubble and Alexander Friedmann also emerging around the same time, it was Lemaître who described it most accurately, with Albert Einstein moving to endorse the theory after its publication. Lemaître's prediction of the accelerating expansion of the universe would go on to be confirmed in the Nineties by observations made by, ironically, the Hubble Space Telescope.

Lemaître's theory was later ratified by the Hubble telescope in 1991

FLEMING'S GREAT MISTAKE

1928

The development of penicillin was an amazing story of accidental discovery. Working hard in his laboratory for months on end, Scottish scientist Alexander Fleming decided to take a month-long holiday in August 1928 to see his family. Quickly throwing some of his things together he promptly left London, leaving his workplace in a bit of a mess; this mess included a number of Petri dishes filled with the bacteria staphylococci. Little did Fleming realise that these Petri dishes would help him revolutionise the world of medicine.

On returning to London and entering his laboratory Fleming immediately noticed that on one of the Petri dishes a distinctive mould had grown and in doing so killed any of the nearby staphylococci bacteria.

After tidying up, Fleming attempted to regrow the mould himself in a pure culture. He succeeded shortly after and, after trialling the culture on various bacteria, saw that it destroyed several that caused disease. Realising what he had discovered, Fleming published his findings and so was born the precursor to the modern-day antibiotic.

"The very concept of a genetic code was a monumental breakthrough"

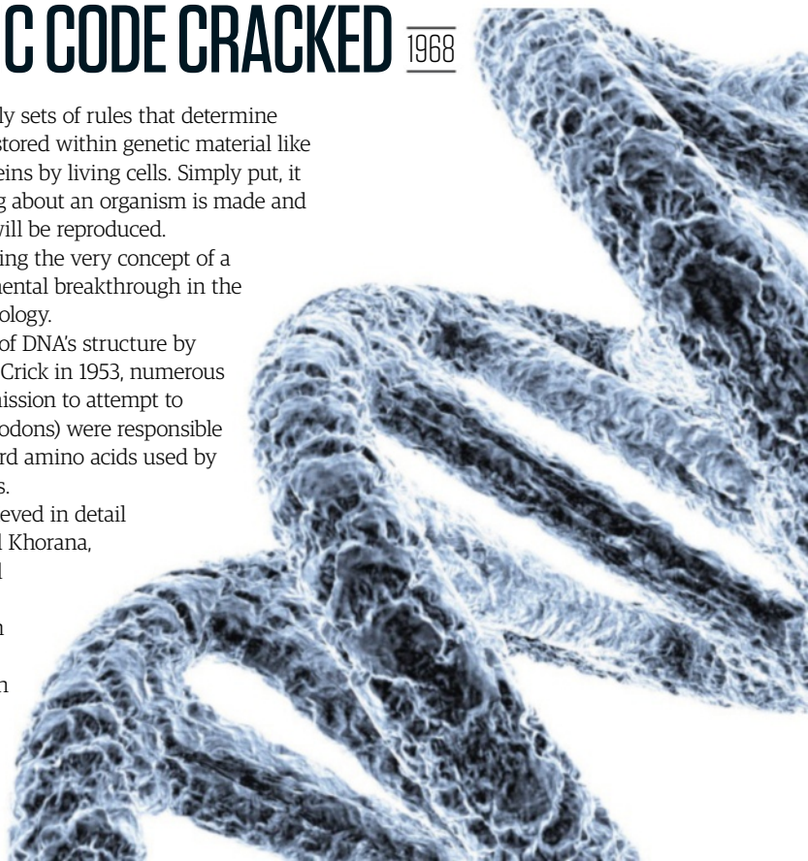
THE GENETIC CODE CRACKED 1968

Genetic codes are essentially sets of rules that determine how information which is stored within genetic material like DNA is translated into proteins by living cells. Simply put, it determines how everything about an organism is made and how that organism's cells will be reproduced.

As such, simply discovering the very concept of a genetic code was a monumental breakthrough in the grand scheme of human biology.

Following the discovery of DNA's structure by James Watson and Francis Crick in 1953, numerous scientists embarked on a mission to attempt to determine what bases (or codons) were responsible for encoding the 20 standard amino acids used by living cells to build proteins.

This was eventually achieved in detail by biochemists Har Gobind Khorana, Robert Holley and Marshall Nirenberg, with the trio scooping the Nobel Prize in Physiology or Medicine in 1968 for 'their interpretation of the genetic code'.



THE SUN IS THE CENTRE OF THE SOLAR SYSTEM 1543

Prior to Nicolaus Copernicus, it was an accepted fact that Earth was at the centre of the galaxy, as laid down in the Ptolemaic model of the heavens (devised by Claudius Ptolemy in the second century CE).

Earth was the focal point of the galaxy (which was considered to be the entire universe in the 16th century) and to dispute this geocentric model of the Solar System was considered heretical by the Catholic Church. Indeed, support for Copernicus's system landed Galileo Galilei under house arrest by the Catholic Inquisition almost a century later and he was considered 'vehemently suspect of heresy'. However, when Copernicus published his treatise *On The Revolution Of The Heavenly Spheres* in 1543, he proposed that this model was a fallacy and that all his research indicated that the galaxy was, in fact, heliocentric (ie centred around the Sun). This heliocentric model of the Solar System, was, as you might expect, strenuously resisted during Copernicus's lifetime and incredibly it would be another 200 years before it was accepted, aided by Isaac Newton's evidence put forward in *Principia Mathematica* in 1687.

QUANTUM THEORY 1920

For centuries the Standard Model of physics – set by Newton and his contemporaries – was considered the definitive set of laws that governed the physical world. But by the start of the 20th century multiple disciplines – such as atomic theory – were hinting there could be a whole other level to physics that was yet unaccounted for.

By 1920 these disciplines loosely intertwined to create quantum theory (or quantum mechanics) – a new branch of physics that focused on physical phenomena on truly microscopic scales, entering the realm of atomic and even subatomic particles. From Albert Einstein's work on electromagnetic radiation, through to Werner Heisenberg's matrix mechanics and Erwin Schrödinger's wave mechanics (the mind behind the famous 'Schrödinger's cat' paradox), increasingly complex models for how physics works have been at the least theorised or in some cases partly demonstrated. Since then quantum theory has become increasingly important to almost all scientific disciplines, with branches such as quantum chemistry, quantum optics and quantum information science expanding our understanding – or, to be more accurate, our current lack of understanding – about how the universe works on the most fundamental of levels.

Einstein's theory of relativity 1905

Containing both Einstein's theories of special and general relativity, this has single-handedly revolutionised modern physics. Since its conception the theory has transformed theoretical physics and astronomy entirely, largely superseding Newton's take on classical mechanics. It enabled the nuclear age to prosper – both for better and worse – as well as furthering our grasp of neutron stars and black holes.



THE SECRETS OF RADIATION 1903

Marie Curie's theory of radioactivity helped us understand how particles move as well as the health risks of radiation

While the discovery of radiation could be attributed to numerous people, ranging from German physicist Johann Wilhelm Ritter who found ultraviolet in 1801, through to the discovery of neutron radiation in the 1930s, one figure arguably stands out. Polish physicist and chemist Marie Curie – along with her husband, Pierre – studied radiation extensively during their lives, with the pair uncovering two new elements in the late-19th century.

Due to her continued work in the field, which included coining the phrase 'radioactivity' and probing into the nature of radioactive half-lives, she was awarded the Nobel Prize in Physics jointly with her husband and fellow French physicist Henri Becquerel for their 'researches on the radiation phenomena' in 1903. Several years later in 1911 – after Pierre had tragically been killed in a road accident – she would receive the Nobel Prize in Chemistry for the discovery of radium and polonium.

Today, Curie's work into radiation – including the huge danger it poses to humans (Marie Curie famously died of radiation poisoning in 1934) – has proven invaluable to modern science, with everything from energy generation, medicine and astronomy benefiting massively from her findings.



The development and refinement of gunpowder was a gradual process that took place over many centuries

WARFARE REDEFINED

CIRCA NINTH CENTURY

Rumoured to have been invented by ancient Chinese alchemists by accident while searching for an elixir of everlasting life, gunpowder has gone on to redefine warfare. Evolving in use from simple firecracker-style explosives, through to fireworks and on to the motive force behind cannons, muskets, rifles and bombs among many other explosive weapons, gunpowder's discovery has resulted in the deaths of countless millions.

According to science historian Joseph Needham's *Science And Civilisation In China*, the development of gunpowder as we know it today was a gradual process and involved many accidents. One of the most notable of these is recorded to have occurred in 1280, where a large gunpowder arsenal at Wei-yang accidentally caught fire. The resultant explosion, which had been completely underestimated by the alchemists at the time, was so powerful that it killed over 100 men instantly and threw the numerous wooden beams and pillars of the arsenal over a distance of five kilometres (three miles) from the site.

"Gunpowder's discovery has resulted in the deaths of countless millions"

PYTHAGORAS LAYS DOWN HIS THEOREM

SIXTH CENTURY BCE

One of the most beautifully simple yet drastically important discoveries in the history of mathematics, the Pythagorean theorem $a^2+b^2=c^2$ – discovered by Ancient Greek Pythagoras in the sixth century BCE – led to great advances in not just academia but also navigation and construction. Despite its abstract appearance, the theorem simply states that in any right-angled triangle, the square of the hypotenuse (the longest side) is equal in length to the sum of the squares of the other two shorter sides.

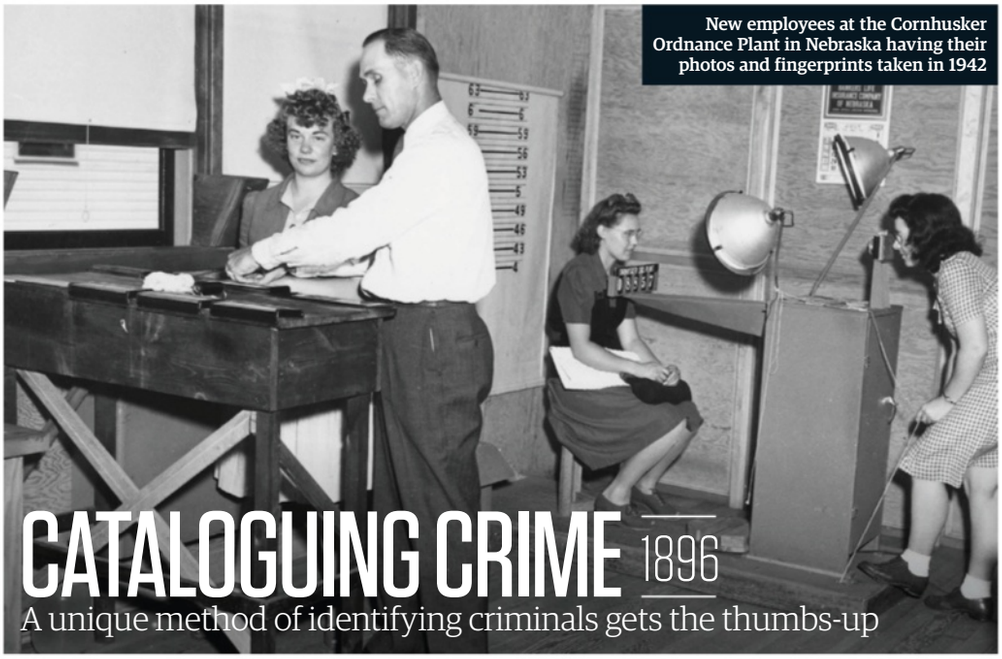


Pythagoras was one of Ancient Greece's greatest minds

DARWIN AND EVOLUTION 1859

When Charles Darwin set off on his round-the-world voyage on 27 December 1831, little did he realise that history was about to be made. As Darwin moved from port to port of far-flung lands, studying geology, natural history and wildlife, a previously conceived theory of his was being fleshed out before his eyes. Evolution – the change in inherited characteristics of biological populations over generations – was becoming irrefutable.

Of course, it would not be until Darwin published *On The Origin Of Species* in 1859 that he would deliver evolution with compelling evidence – and, at the time, religious institutions and many learned scholars decried it. But arguably it was that five-year trip on the HMS Beagle, studying species like the Galápagos tortoise up close, that was the real point of discovery.



New employees at the Cornhusker Ordnance Plant in Nebraska having their photos and fingerprints taken in 1942

CATALOGUING CRIME 1896

A unique method of identifying criminals gets the thumbs-up

While the use of fingerprints as we know it today – to identify people and as a means of catching criminals – is a relatively modern discovery there is evidence that finger and thumb prints were used in ancient times. For example, the Babylonians in 2000-1000 BCE pressed the tips of their fingers into clay to record business transactions, while thumbprints were also used in ancient China as a means of 'signing' documents.

It wasn't until the 19th century that fingerprints were used to reduce crime. Sir William Herschel, a chief magistrate in India, had residents record their fingerprints when signing business deals to fight fraud in 1858. From this point the path to a more universal adoption of fingerprint records was relatively swift; Scottish doctor Henry Faulds published an article discussing using prints as a means of personal identification in 1880 and 12 years later Argentine police officer Juan Vucetich was the first to use prints to catch criminals.

By 1896 Sir Edward Richard Henry developed a classification system that enabled prints to be classified and sorted – Scotland Yard adopted this system in 1901. This led to the capture of criminals due to their genetic makeup and would indelibly change the way that the police solved crime.

THE EARTH IS NOT FLAT

1522

The idea that Earth was anything other than a flat disc was once inconceivable. Indeed, it was not until the sixth century BCE that just the concept of a spherical Earth was even speculated. Even then it was not until around the third century BCE that Greek astronomy demonstrated Earth was spherical, with this model for the planets of the heavens slowly dispersed via the old trade routes. In reality the notion of a flat Earth lingered until much later. Believe it or not, it wasn't until the early-16th century that conclusive proof of the Earth's shape was attained, with Portuguese explorer Ferdinand Magellan leading the first expedition around the planet. While Magellan died on the three-year journey – killed during battle in the Philippines – a handful of sailors continued the voyage and arrived in Spain on 6 September 1522. Of course, as soon as we ventured into space in the mid-20th century there could no longer be any doubt.



The theory of absolutely everything 1970s

The Standard Model of particle physics addresses the strong, electromagnetic and weak nuclear interactions that control the dynamics of subatomic particles. This robust theory is essential for explaining how the physical world works.



The discovery of germs helped us to control infection

HOW GERMS CAUSE DISEASE 1905

Prior to the discovery of bacteria in 1676 by Dutch scientist Antonie van Leeuwenhoek and the later discovery of the connected germ theory of disease, which states illness can be caused by micro-organisms, a number of wacky and superstitious explanations were commonplace.

Chief among these was the belief in the miasma theory, which stated that deadly diseases such as cholera, chlamydia and the Black Death (plague) were caused by the spreading of a noxious form of air. Indeed, this was the prevailing theory of explaining disease right up until the 19th century. After almost 100 years of research by many scientists, the German Robert Koch conclusively proved with his work on tuberculosis that germ theory was real – a feat that earned him a Nobel prize in 1905. On the back of his success Koch devised a set of rules to test if an organism – such as bacteria – causes disease and these criteria are still used in modern medicine.

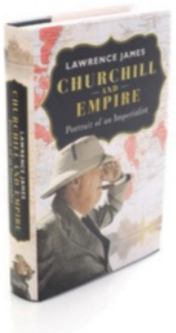
Today, thanks to the discovery that certain bacteria and viruses can cause infectious diseases and that they can be spread via environmental mechanisms, like water, air or physical contact, doctors have a far more accurate understanding of how to both prevent and treat many illnesses.

© Alamy; NASA; Look and Learn; SPL; CERN; Getty; Corbis

CHURCHILL AND EMPIRE

The contradictions behind the British icon laid bare

Author: Lawrence James **Publisher:** Weidenfeld & Nicolson **Price:** £25



Criticism of Winston Churchill is a difficult thing to balance. The sheer strength of feeling that surrounds his triumphs – ie his dogged defence of Britain throughout World War II – is offset by the bullish belligerence of his foreign policy – ie his confrontational attitude toward the Soviet Union, his opposition to Indian independence and his role in the increasing alienation Australia felt from the Motherland across the 20th century's two world wars.

To find someone who isn't about to go into Lawrence James's *Churchill And Empire: Portrait Of An Imperialist* without an oven-ready opinion on the subject would be no mean feat, and throughout there's a suspicion that James himself is a part of the same problem.

Hugely respected author of *The Rise & Fall Of The British Empire* and *Raj: The Making And Unmaking Of British India*, there's no doubting his passion for the subject and obvious knowledge, but from the intro onward James plays rhetorical cards that suggest bias. By claiming at the start not to draw checks and balances between, say, the Amritsar Massacre of Indian civilians and the establishment of a medical school at Aga, he *is* suggesting a false equivalence in a rather backhanded way when it should go without saying that the brutal murder of 300 people is in no way a fair trade-off for a spot of further education.

Picking up the story with Winston Churchill's military service in the various Frontier Wars of the late-19th century and how that shaped his view of the British Empire, James consciously opts out of getting bogged down by any moral debate about European colonialism, instead exploring Churchill's world view. While this allows the text to progress briskly along a chronological narrative with minimal asides, balanced commentary increasingly comes second place to Churchill's own opinions – another soft bias as objective-framing devices are discarded in favour of presenting belief as fact until perhaps a final paragraph suddenly explains otherwise. Similarly a few ambiguous sentences – including one that seems to suggest that the Australian Imperial Force landed at Suvla Bay during the Gallipoli Campaign in WWI, which is a misconception drawn entirely from Eric Bogle's 1971 folk song *And The Band Played Waltzing Matilda* – serve to undermine the text's authority.

While it does effectively make the point that bias isn't always necessarily what you say but how you choose to say it, it's still a maddening experience to read. It's something of a tragedy, as behind the obfuscated viewpoints of *Churchill And Empire* is an insightful and humanising study of a man so often eagerly reduced to caricature – by both his champions and critics.

The contradictions between Churchill's belief in the British Empire as a force for good and his willingness to condone or sanction abuses of liberty to safeguard it are laid bare. While the man himself is occasionally absolved a little too keenly of any responsibility for some of the Empire's misdeeds – including his beliefs in the inherent superiority of white Britons which are rationalised like a child caught stomping daffodils with a weak-sounding "Everybody else was doing it!" – *Churchill And Empire* is by no means a biography that makes its subject out to be a saint.

James has a far grander and more laudable aim than shoring up the myth with a putty of Union flag bunting and cigar-smoking bulldogs. The real question is whether he achieves it – whether the author's insight outweighs his lapses into the infuriatingly biased? That, fittingly, comes down to the prejudices of the reader.

Verdict ★★★☆☆



If you like this try...

Churchill: A Study In Greatness
Geoffrey Best
Objectivity is thrown out the window in this definitive praise of the British statesman.

"Churchill And Empire is a humanising study of a man so often reduced to caricature"



TOP FIVE WINSTON VS THE WORLD

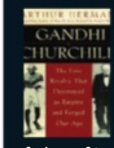
A few more titles that shine a light on Britain's most famous politician

MENZIES & CHURCHILL AT WAR



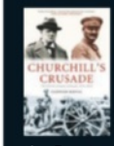
Author: David Day
Historian David Day reveals how the great bulldog played on the Australian prime minister Robert Menzies' imperial ambitions while hanging the Dominion out to dry.

GANDHI & CHURCHILL



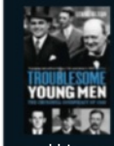
Author: Arthur Herman
In this book we learn how the bitter rivalry between the father of Indian independence, Mahatma Gandhi, and the Empire's staunchest defender broke apart the family.

CHURCHILL'S CRUSADE



Author: Clifford Kinvig
Churchill's anti-Bolshevik agenda and dogged interference in the Russian Civil War between 1918 and 1920 would earn him a rival he couldn't defeat in the long term – Stalin.

TROUBLESOME YOUNG MEN



Author: Lynne Olson
How the 1940 coup against Neville Chamberlain and his government risked Churchill's career, his reputation and his country as he led Britain into WWII.

ALLIES AT WAR

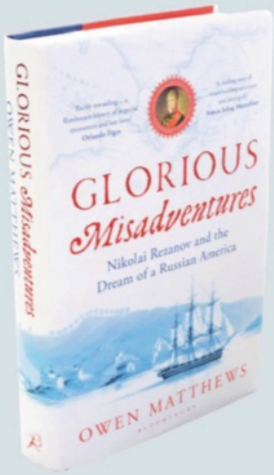


Author: Simon Berthon
A book that came off the back of a joint BBC/PBS documentary, it explores how one of Britain's closest wartime allies, the equally bullish French general Charles de Gaulle, became a thorn in Churchill's side.

GLORIOUS MISADVENTURES

The sordid tale of the empire that nearly was

Author: Owen Matthews **Publisher:** Bloomsbury **Price:** £20



EDITOR'S CHOICE



Simultaneously ahead of his time yet very much of his age, shameless social climber and ambitious empire builder Nikolai Rezanov left the Russian court of Catherine the Great (as well as later rulers) on a mission to make Russia the dominant 18th-century superpower in the North Pacific.

Accompanied by satirical illustrations from his travelling companions and graphic first-hand accounts that preserve even the obscenities, *Glorious Misadventures: Nikolai Rezanov And The Dream Of A Russian America* becomes a tragic-comedy epic in the hands of journalist Owen Matthews, a Gilbert and Sullivan opera in tattered fur hats as Rezanov alienates his crew to the point where they partition off the ship's cabin so they don't have to talk to him!

Setting the scene perfectly with background that explains the Russian Empire's eastward expansion, as well as exploring the symmetry between Russia and Spain's feudal style of colonialism that Rezanov wanted to trade in for the more successful free-market/land-owning system that had given the British and Dutch such a jumpstart, Rezanov is both an incredibly sympathetic and deeply revolting figure – cowardly, selfish and deceitful, yet devoted to his vision and his country.

He dips in and out of the narrative to look at the wider geopolitical balance and the conditions under which the Russian territories in Alaska become more trouble than they're worth – a combination of drunken commanding officers, criminal settlers and warlike First Nations people armed by opportunistic American traders. Eventually forced to sell the colony off to the United States when the cost of running it became too punitive, Matthews wryly observes that Russia's legacy in Alaska is the spread of Orthodox Christianity and alcoholism. Some will find *Glorious Misadventures* a lightweight affair over-focused on narrative at the expense of context, but it's an intriguing vision of a world that nearly came to be and a satisfying romp for more casual readers.

Verdict ★★★★☆

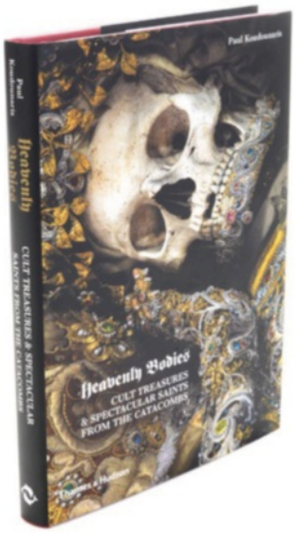


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Internal Colonization **Alexander Etkind**
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HEAVENLY BODIES

And the saints go marching in...

Author: Paul Koudounaris **Publisher:** Thames & Hudson **Price:** £18.95



Filled with page after page of luscious photography showing reclining skeletons in marble shrines, closeups of jewel-encrusted ribcages and eerie gauze-covered skulls, *Heavenly Bodies: Cult Treasures & Spectacular Saints From The Catacombs* makes for a fantastic – albeit macabre – coffee-table tome even without any accompanying words.

Art historian and photographer Paul Koudounaris keeps the compelling visuals at the heart of *Heavenly Bodies* while taking the reader through a particularly bizarre chapter in the history of the Catholic Church.

With traditional relics sequestered in churches and monasteries across German-speaking lands destroyed in the Protestant Reformation, the 1578 discovery of ancient burial chambers in Rome led the Church to 'manufacture' saints on a near-industrial scale – some were even tellingly baptised St Anonymous – based on the premise that as early Christians (which many may not have been, as Jews and some pagans also preferred interment to cremation) they were probably martyred (which the vast majority probably weren't) and thus were de facto saints.

Unworthy of worship according to doctrine – to pray to them, unlike canonised saints would be idolatry – they were still worthy of respect and a much-needed focus for the sorely tested faith of German and Swiss Catholics in the 16th to 18th centuries. Decked out in gold, jewels and fascinating symbolism – their faces sometimes even ghoulishly reconstructed with wax – they were subject to rapturous receptions in even the poorest of parishes. Koudounaris details the elaborate rituals that greeted them, the place of the Catacomb Saints in culture, the ecosystem that sprung up to support this peculiar industry, plus the development of styles of lace and gauze used to wrap the bones.



Although the views of contemporary Protestant observers are brought into the narrative to provide a palate-cleansing shot of cynicism, Koudounaris recounts it all without criticism or undue reverence – merely a scholarly curiosity that, through the concise narrative and incredible photography of *Heavenly Bodies*, serves to pull the reader into the journey. It's utterly spectacular, hugely interesting and almost unbelievable – like only the best history can be.

Verdict ★★★★☆



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Visiting funerary sites in 20 countries, Koudounaris's earlier volume is a tour of the world's most dramatic burial traditions.



The end of empires revisited

FALL OF EAGLES

Available on: DVD

An intimate insight into the lives of Europe's 19th-century monarchies



Returning to DVD courtesy of Simply Media, the sheer stodginess of 13-part historical re-enactment *Fall Of Eagles* will instantly bring back memories of big brown tellies being wheeled into classrooms.

Originally broadcast in 1974, *Fall Of Eagles* will be too slow and stagey for some, consisting mostly of people in bonnets sitting around pursing their lips, while an avuncular narrator (Michael Hordern of *Labyrinth* fame) crudely whitewashes the passage of time.

Chronicling the last years of the Hohenzollern, Hapsburg and Romanov dynasties, each episode follows one family through key events delivered through often contrived methods that ensures fact remains at the forefront as characters effectively lecture each other on Hungarian agitation or growing Prussian militarisation. Sadly those expecting the pay-off of set-piece battle scenes in exchange for all the laboured exposition get a few illustrations and paintings with Hordern's narration.

Like all the classic BBC dramas, *Fall Of Eagles* is undeniably informative and ambitious in scope – effectively setting up not just the broad brushstrokes on the road to WWI, but also the complicated personal relationships of the characters. However the sepulchral pacing means it quickly sinks into an elaborate game of *Spot The Veteran BBC Actor In A False Beard*. The years haven't been kind to this style of historical drama, but it remains a valuable aid to decoding the era's labyrinthine politics.

Verdict ★★★☆☆



If you like this try...

Nicholas And Alexandra

One of the most poignant epics ever made, 1971's Oscar-winning *Nicholas And Alexandra* follows the last years of the Romanov family.

Shining a torch into the City of Light

PETER ACKROYD'S VENICE

Available on: DVD



First broadcast in 2009 across four parts and only now making its way onto DVD, *Peter Ackroyd's Venice* can't help but seem an anaemic companion to his written biography of the city released in the same year: *Venice: Pure City*. But there's a lot in the show to enjoy.

Being a Sky Arts programme the emphasis is naturally on art history. With the four episodes based neatly around architecture, art, music and theatre, the series is a satisfying and engaging introduction, but with so much directly cribbed from *Pure City* there's little to surprise those who have already read the book. There are the visuals to enjoy obviously – and the evocative classical score to enhance them – so let's not discount the pure travel porn of all those panning shots of Gothic façades and crumbling brickwork – not to forget the bombastic opening sequence where Ackroyd glides into the city on a boat.

As art reflects events and geography, Ackroyd is given the freedom to weave in and out of historical events – in particular the rise and fall of the Venetian Republic – without breaking stride, and the show has far wider scope and insight than you might first expect.

If you haven't sprained your wrist holding up *Pure City*, *Peter Ackroyd's Venice* is far less problematic and far more satisfying on its own terms. Ackroyd is an informative and authoritative host, and a surprisingly poetic one, unafraid to editorialise or bemoan barbaric later design decisions. Through carefully chosen interviews these asides are given real weight instead of being mere humbuggery. For cultured travellers and casual scholars of Renaissance history especially, it's great viewing.



A perfect introduction to Venice's artistic heritage

Verdict ★★★★☆



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Antonio Carluccio's idiosyncratic doc explores Sicily through food and its best-known book: Di Lampedusa's *The Leopard*.

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Effectively an exhibition in your palm, this fascinating app from the US National Archives and Records Administration allows you to swipe your way through the Cuban Missile Crisis of 1962 via first-hand documents and magazine-style pages.

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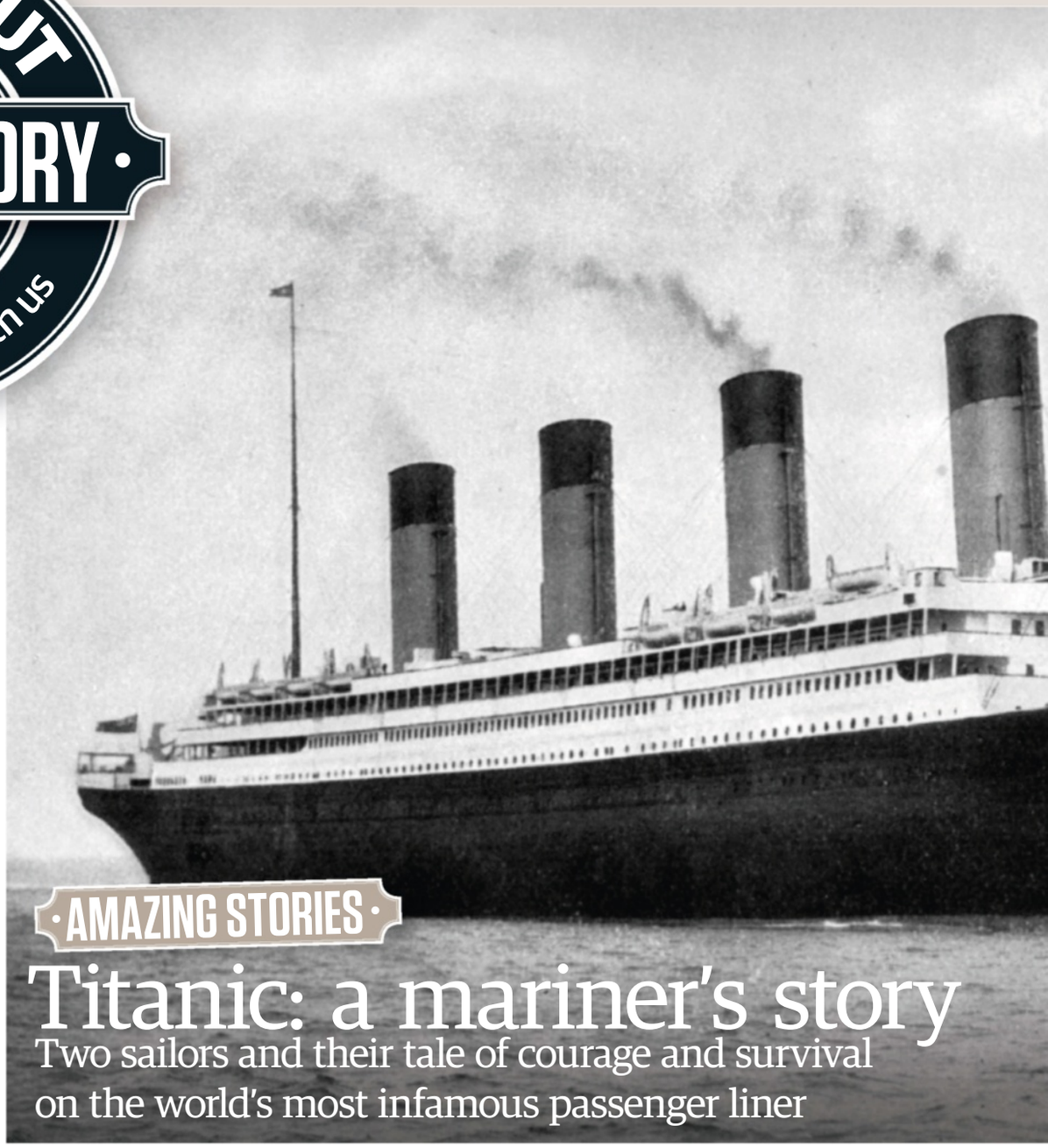
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AMAZING STORIES

Titanic: a mariner's story

Two sailors and their tale of courage and survival on the world's most infamous passenger liner



Chris Fenton, Southampton

Like many men from the Chapel area of Southampton in 1912, my great-great-grandfather, Walter Hurst, was a mariner serving on board merchant and commercial ships including the supposedly 'unsinkable' Titanic. Walter's story is one of courage and bravery, but also one that carries a dark past.

His father-in-law, William Mintram, was notorious in Chapel having served a nine-year prison sentence for brutally killing his wife, Eliza, in a fit of rage. After he was paroled Walter got him a job with the White Star Line and, as luck would have it, there was a White Star ship in Southampton Docks ready for her maiden voyage: the RMS Titanic.

As the two men embarked neither of them had any idea that they were about to become part of a story that would echo through history.

Walter and William were sleeping in their crew cabin on the night of 14 April when they heard a 'grinding crash'. William ran up to the deck to investigate, and, bursting back into the cabin with a lump of ice, shouted, "Better get up, lad, the ship's hit a berg!" throwing the ice onto Walter's bunk.

Walter quickly gathered his warm clothes as it was bitterly cold and went with William to the top deck. At first there was an eerie calm; some lifeboats were being made ready but the mood was generally relaxed. Walter heard passengers saying, "She can't possibly sink." He could plainly see that the ship was sinking and advised the passengers to

Send your memories to: @ allabouthistory@imagine-publishing.co.uk



The RMS Titanic, the allegedly 'unsinkable' ship

The Titanic disaster was major news in the press for weeks



A shot of Chris's great-great-grandfather, Walter Hurst



Mr and Mrs Hurst in later life

get to the lifeboats. One lifeboat had already gone so Walter turned to a friend and said, "If they are sending the boats away they can just as well put some people on them!" The lifeboats were designed to take 65 souls, yet the boat he saw had just five crew and four first-class passengers.

As the Titanic started to rise up, flooding the forward deck, the situation became desperate and Walter heard gunshots from across the ship. It was the chief officer, William Murdoch, firing a revolver to ward off the panicked crowd swamping the remaining lifeboats. Walter, William and other members of the crew managed to get a small collapsible raft off the top of the Smoking Lounge and throw it overboard. With the raft in the water, they would have to jump into the sea to reach it.

Walter didn't have a lifejacket and, in a final act of self-sacrifice, William handed Walter his lifejacket, saying, "You've got more to live for than me, lad," before Walter jumped into the icy water. He never saw William again, but William's courage is still remembered in the family as an act of redemption for his past crimes. Walter was in the water for no more than 15 minutes before he reached the raft.

He remembered the screaming, the cries for help and the horrible silence when the people left in the water died of hypothermia; it would haunt him until the end of his days. He remembered the 'big shots' in the half-full boats and the captain, in a commanding voice, encouraging his crew to save themselves, shouting "Good boys!" when they got the raft into the water.

Walter was rescued by the RMS Carpathia – one of the passenger ships called to Titanic's aid. The White Star Line stopped his pay from the moment Titanic sunk, stating that he was no longer working on the ship and could not expect to be paid for getting rescued. If it wasn't for the seamen's mission in New York he would have had no dry clothes or money for the return journey to Southampton. His wife would receive news that he was alive a week later, having previously been told that he'd perished along with his father-in-law.

As a testament to his character, Walter stayed in the merchant navy and served in WWI where, in a cruel twist of fate, he survived another sinking when the hospital ship Britannic struck an enemy mine. He died in Southampton, aged 80, in 1964.

Do you know someone who was on board the RMS Titanic?

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ANTIQUES & OBJECTS

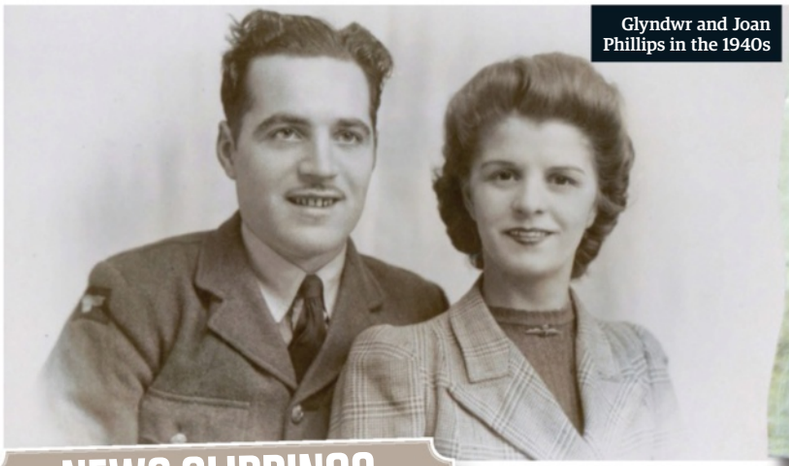
The flag that says, 'We come in peace'



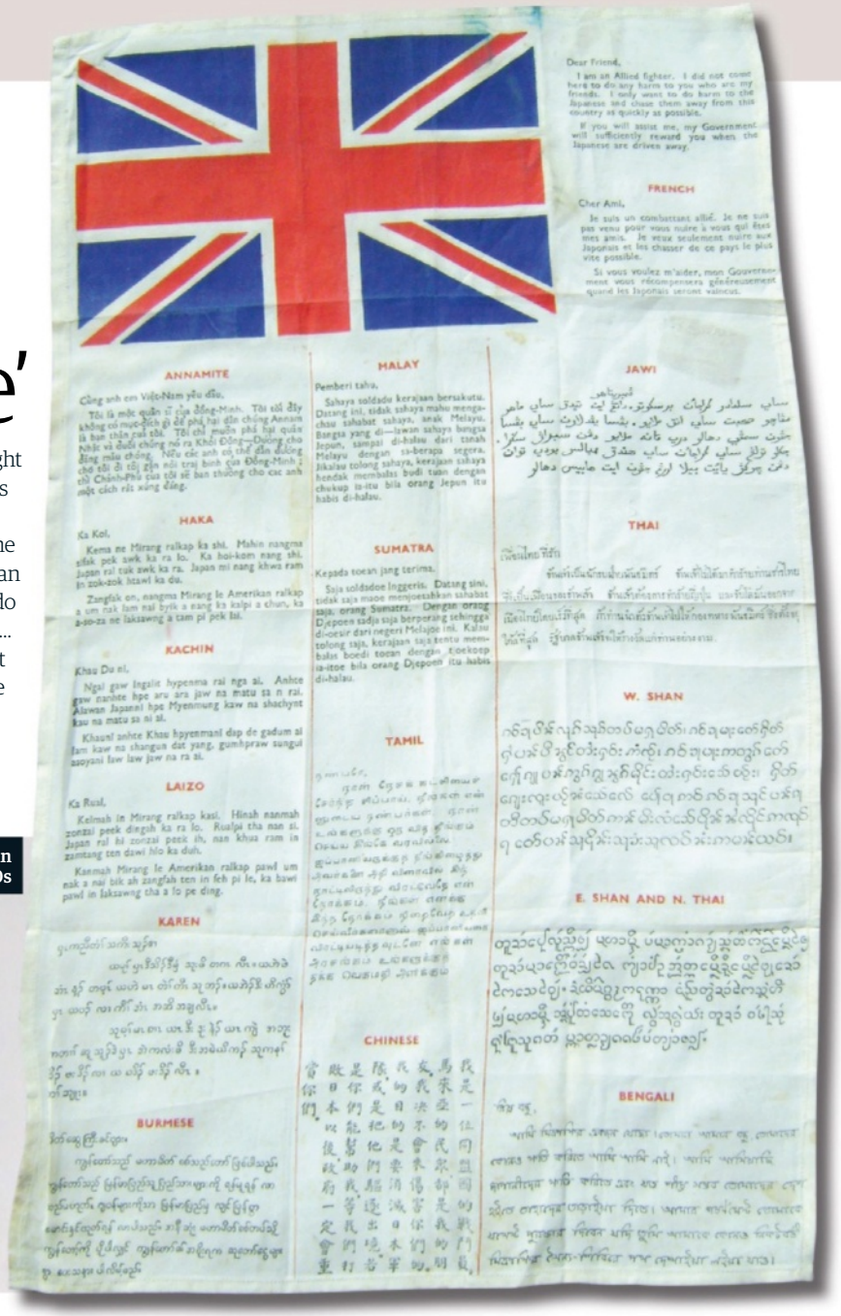
Michael G Phillips, Leicestershire

Glyndwr and Joan Phillips were married on 24 December 1942 in Leicester. At this time Glyn was in the RAF (620976 LAC Phillips). He was based at various places in the UK and also Algiers, Tunisia, and Gibraltar. He met Joan at the Palais De Dance in Humberstone Gate, Leicester. At this time Glyn was posted at North Luffenham in Rutland. I wanted to share this picture of a keepsake Glyn brought home from the war. All Allied fighters carried one of these flags with the following message printed on silk. The English translates: 'Dear friend, I am an Allied fighter. I do not come here to do any harm to you who are my friends... If you will assist me, my Government will sufficiently reward you when the Japanese are driven away.'

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Glyndwr and Joan Phillips in the 1940s



NEWS CLIPPINGS

An elephant's never forgotten



Stuart Lythgoe, Sheffield

The included image is still popular in the modern imagination of Sheffield people and is one I'd like to share with your readers. I've been researching the Sheffield-based company Thos W Ward for some time now and this picture comes from the collection I have built up during this research.

Lizzie the elephant was brought in when the horses used by Ward's to move steel around Sheffield were requisitioned for the war effort, leaving them and other Sheffield steel companies in varying degrees of difficulty in how to continue their steel supply.

This particular elephant was affectionately named Lizzie and worked for most of the war moving steel around the Sheffield streets and endeared herself and the company that employed her in the local mind both then and into the modern day. During Ward's centenary commemorations which took place in 1978, Lizzie the elephant featured often in the company's publicity material.



Lizzie the elephant hard at work in Sheffield

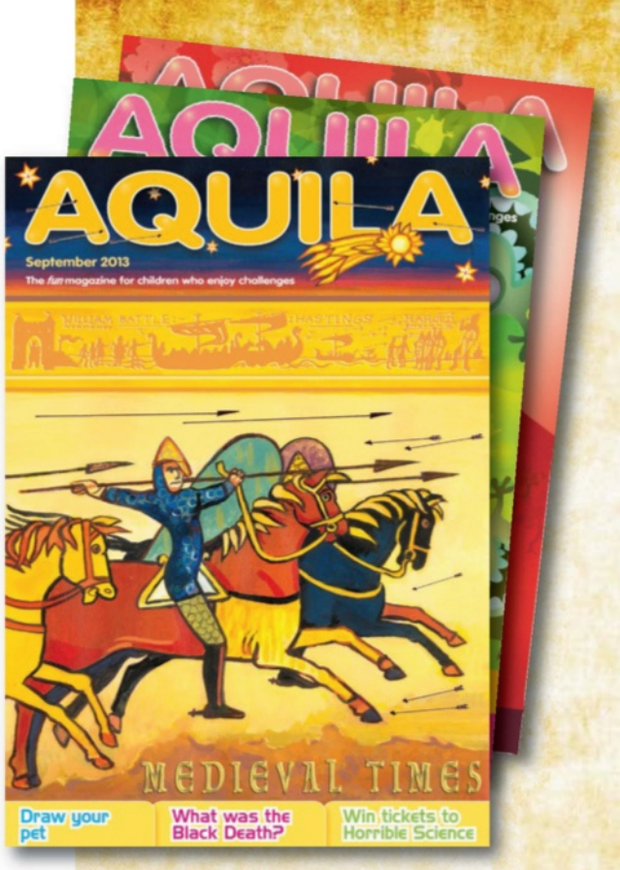
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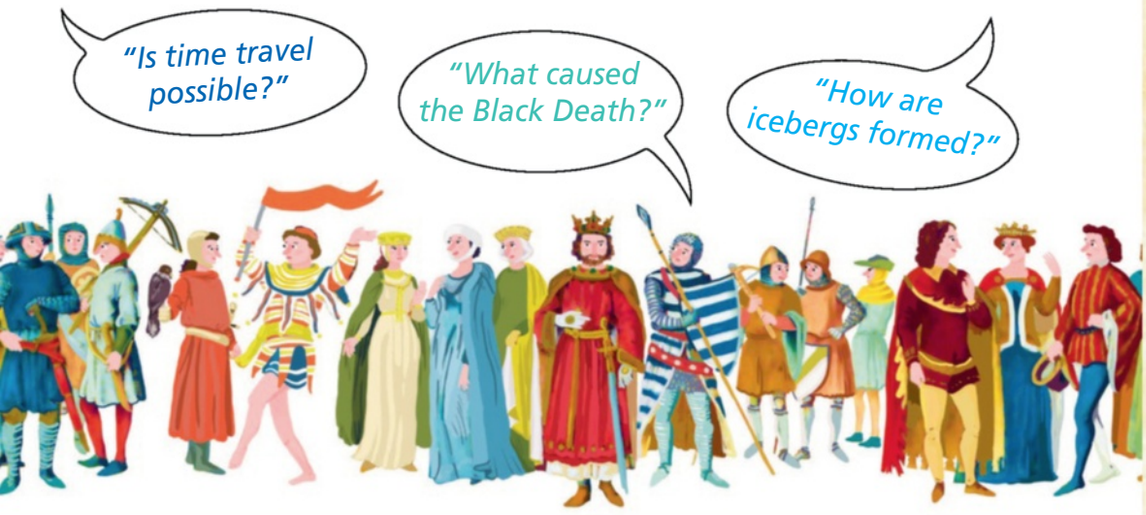
The magazine will also nudge children's awareness in the right direction with thought-provoking articles that sometimes include elements of philosophy, health and well-being.

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HISTORY VS HOLLYWOOD

Fact versus fiction on the silver screen...

ROBIN HOOD: PRINCE OF THIEVES

Director: Kevin Reynolds **Starring:** Kevin Costner, Morgan Freeman, Alan Rickman, Mary Elizabeth Mastrantonio
Country of origin: USA **Year made:** 1991

The existence of folk hero Robin Hood has always been debated, but was the research for the rest of this film on target?



01 On their way to Locksley Castle, Robin and Azeem encounter the Sheriff's soldiers and Robin warns that they are on his land. They are actually walking across Hadrian's Wall in Northumberland, which is 320 kilometres (200 miles) north.



02 At several points in the film we see Azeem using a makeshift refracting telescope. However, these instruments were not invented until several hundred years later, at the start of the 17th century. This design was famously refined by Galileo Galilei in 1609.



03 The film's religious ceremonies are conducted more or less entirely in English, but in 1194 England was still Catholic, so weddings, mass and so on would have been conducted in Latin.



04 When Robin returns to England with Azeem, he claims they will 'celebrate with my father' by nightfall. However, Dover, on the south coast of England where they land, is some 320 kilometres (200 miles) away from Nottingham so the journey would have taken several days.



05 The film ends with King Richard I arriving in what appears to be autumn. Although he did return in the year 1194, he landed in March and was gone again by May.



06 Though Azeem produces barrels of gunpowder for use in an audacious rescue, knowledge of how to manufacture the substance didn't spread from China to the Middle East until the early-13th century. The earliest record of black powder in England is around the mid-13th century.



07 The Sheriff's scribe declares in five months Robin's outlaws had stolen '3-4 million'. Though this could be an attempt to translate an equivalent amount into modern-day money, this figure is simply unrealistic and is a gross overestimation of the wealth in Nottingham at the time.

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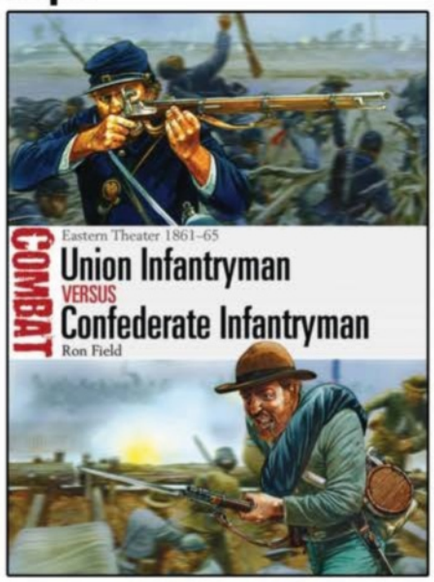
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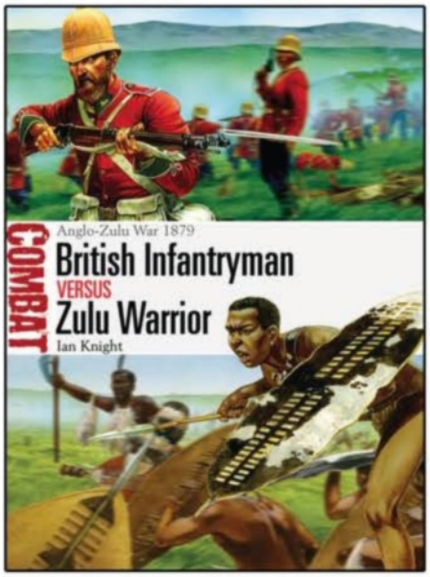
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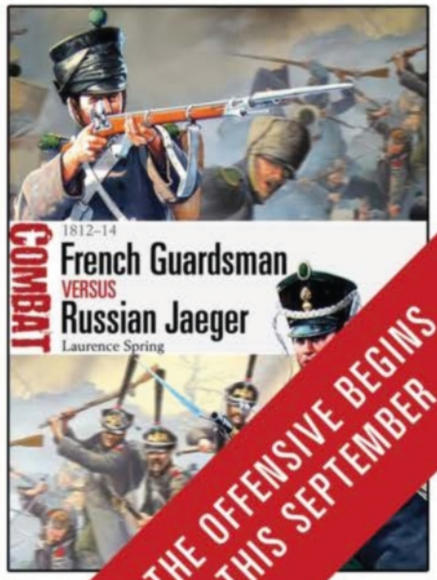
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